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A Civil Service for the polys

Polytechnic administrators. It can be argued, do a more difficult job than their university colleagues. Yet they cannot be denied, receive inferior rewards in terms of both status and salaries. Universities have always possessed a civil service of administrators, while the polytechnics have only recently emerged from the shadows of a tradition in which the principal, aided by two or three senior colleagues and a handful of clerks, was responsible for the administration of the college with the town hall looming bigbrotherly in the background.

The greater difficulty of the job of polytechnic administrators has two aspects. First, polytechnics are often more complex institutions than universities. There may be less research to administer, but polytechnic research (and consultancy) has a bewildering variety of types and sources that may make up for its still comparatively small scale. Polytechnic students are certainly more varied than those in universities and so represent a heavier administrative load. More are on sandwich courses or are studying part-time. More are on other than standard degree courses or are mature students, and there is an almost bewildering collection of short courses.

The second aspect arises from the fact that polytechnics lack the autonomy enjoyed (increasingly precariously) by universities. Financial

administration is constrained by their lack of corporate independence which means that no polytechnic, with the exception of the five inner London polytechnics, even has its own bank account. Academic administration is constrained and consumed by the demands of validating bodies like the Council for National Academic Awards. The price of both this desirable diversity and perhaps necessary accountability has to be paid by polytechnic administrators. It is a price worth paying but it should not be underestimated.

The trouble is that it is underestimated. Administrators in polytechnics, tied to town hall salary scales, are paid much less than their university colleagues or their polytechnic academic colleagues. Their number is often inadequate for the important jobs they have to do. The great inequality of the binary policy does not exist in the pay and number of academic staff in the two halves of higher education, which except at senior levels tend to be surprisingly similar, but in those of non-teaching staff including administrators. But it is wrong to leave the impression that the town hall is entirely to blame. Some polytechnics have generously staffed directorates of administrative academics and hard-pressed administrators. This balance is probably wrong for a number of reasons. First, it may be a misuse of

scarce administrative resources (too many generals, too few men). Second it tends to perpetuate the tradition of over-personal leadership in further education.

Third, it may depress the status and influence of professional administrators. They are kept in a subordinate or firmly technical role because the existence of powerful directorates prevents their gaining the necessary legitimacy on broader policy issues. This is a problem too in universities but not to the same extent. Yet if institutions, universities and polytechnics, are to retain their integrity and their effectiveness, they badly need to foster Civil Service-style administrators staffed by generic administrators who are not regarded as second-class members of the academic community.

However it is wrong to be too gloomy. Trusting in the effective formula developed by the Conference of University Administrators, the Association of Polytechnic Administrators has been very successful in its attempt to raise the self-consciousness and self-confidence of its members (although a move away from polytechnic exclusivity to take in the Humberides and Ealing would be very welcome). But it remains important to emphasize that the barriers to be overcome are not just bad pay and town hall apron strings but also the instinctive and unequal relationship between academics and administrators.

A whiff of Keynes

The Department of Education and Science has won a quiet Whitehall triumph with its success in persuading the Treasury that half the cost of the extra students enrolled by polytechnics, and colleges, should be met by the government. The government's expenditure plans should be offset against the social security payments that would have been made to these students had they remained unemployed.

The immediate advantage to DES ministers is that they can afford to take a much more relaxed view of over-recruitment in the non-university sector - in sharp contrast to the hard line that the University Grants Committee has felt it had to adopt to universities which appeared to be overshooting their 1984-85 student targets. Now the DES can adopt a liberal attitude to student recruitment in the safe knowledge that the Treasury will pick up half of any bill. So the age participation rate can be kept up and sensitive parents and students do not need to be disappointed.

It is difficult to dissent from a policy that, by however unsatisfactory a route, leads to a modest extension of opportunities for higher education. But perhaps two grumbles can be allowed. First, as with the "new blood" appointments in the universities, the government can hardly expect to be praised for

the DES's Whitehall victory has to be acknowledged. Of course, few people in higher education need to be convinced that it is more sensible to pay young, and not-so-young, people to study rather than to remain idle on the dole. But a belief in the value of such long-range investment in human skills is not widespread within the present Government, and the Treasury has always preferred a narrow accountants' view of future investment.

It may be provocative to term the DES's victory the thin edge of a wedge that can be driven into the heart of present monetarist orthodoxy. But the tactical considerations that dictate a discreet silence in Elizabeth House do not blind the rest of us. If it is accepted that it makes economic sense to pay people to study rather than to be unemployed, and it is therefore legitimate to discount educational expenditure against the cost of running an economy at significant levels below its full capacity. But here we are back to Keynes, and to politics, so perhaps it is the place to

Update or else!

In this light, Dr George Tolley's suggestion that professional status should depend on a willingness to find time for continuing education which finished during the war, has several attractions. Indeed, doctors and accountants may already have to meet this sort of requirement. Dr Tolley argues that "the education" would also benefit the other professions.

This need not imply an endless procession of examinations. Very often, it could simply mean demonstrating an active intellectual interest in new developments. The American Institute of Chemists, for example, awards continuing education credits for attendance at seminars or short courses, and this model might well be extended to cater for the courses Dr Tolley's Open Tech will one day offer for updating technical skills.

The problems of carrying through the programs are considerable, but not insurmountable. The fastest moving fields are often as now that they have never paused to found professional institutions. But in these fields the market usually ensures that those who fall behind lose relevance. Then again some professions, such as the engineers, have all too many institutions - but continuing education will be well up the agenda of the Engineering Council from now on, so a unified for attendance at seminars or short courses, and this model might well be extended to cater for the courses Dr Tolley's Open Tech will one day offer for updating technical skills.

Laurie Taylor



("US professor had 34 academic aliases" - *THES*, April 8).

Ah Dr Droggett. Thanks so much for popping in. I just wanted to have a quiet word with you about a little matter that's cropped up. Only too pleased Professor Lapping. Nothing serious I hope. No, not really, Droggett. Shouldn't take a moment.

Jolly good. Now I'm certain there's a perfectly satisfactory explanation, Droggett, but I have to tell you that we've had a rather tricky letter this week from a prominent city university in the north of England.

And... well... quite frankly, Droggett, they've written to say that they believe that you may be working for them.

What's that sir? They believe - and I must say that the large colour snap they enclose with their letter does lend some credibility to their argument - that you are a part-time lecturer employed by them under the name of Professor Linklater.

Linklater? That's right, Droggett. Do you deny this charge?

Not exactly sir, no. But it is, as you say, only a part-time post and one which I find perfectly compatible with my other commitments. Your other commitments at this university?

Yes. Those commitments... and a very small amount of other external part-time work.

For example? Well, since you press me sir, I must admit that I'm lucky enough to be Professor Lionel Bonington of Leicester University.

Oriental studies? Exactly sir.

Anything else Droggett? Dr Kurt Lobenstein.

Sheffield? Computer science? Yes sir. It's more or less a straight run up the M1 from Leicester.

That's the lot? Yes indeed. Apart that is, from a minor administrative role which is of a slightly delicate nature.

I think you can rely on my professional discretion in such matters, Droggett.

Well sir, and you'll understand why I'd prefer this to remain strictly between ourselves, I am also proud to be the present vice chancellor of Good heavens. Now I see the resemblance. It's just the moustache. Exactly sir. So you'll appreciate the need...

Quite so. Do you wish to take this whole business any further Professor Lapping? I must admit there are no complaints about your work in this department. It seems well up to the standard which is required of a senior lecturer.

Thank you sir. So I may go? No so quickly Droggett. I don't think this matter can be completely swept under the carpet. In fact, in view of your special abilities in this direction, I wish to impose a minor but appropriate sanction.

Sir? Briefly Droggett. I wonder if you mind attending faculty board next Wednesday? The whole process is being pushed for the rest of this term.

As punishment, sir? No, Droggett. As me. As I said.

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More students in 1990, says DES forecast

by Peter Scott

The Department of Education and Science now expects that higher education will enrol considerably more students over the next ten years than when it last made a formal projection of future student demand in 1979.

A revised projection published this week shows that despite the cuts imposed by the present government there are still expected to be more students in universities, polytechnics and colleges in 1990 than was anticipated in the last year of Labour rule.

The new figures reveal that the DES now predicts that:

● There will be between 13,000 and 26,000 more students in 1985/86 than expected in 1979.

● There will still be more students at the end of the decade than there are today despite a 10 per cent fall in the 18-year-old age group.

● The number of students in 1994/95, the bottom of the demographic trough, will only be 14 per cent less than today's total of 554,000. This fall is less than half that in the size of the 18-year-olds age group.

● The age participation rate will rise steadily from the present figure of 13.5 per cent up to and into the 1990s to reach a new peak of 15.9 per cent according to the most optimistic projection or 14.9 per cent according to the most pessimistic.

This DES report is the first stage in fulfilling the promise made in the February White Paper on public expenditure that "provision for higher education beyond 1985/86 when the

age groups will be falling is to be reviewed." It is significant therefore that the projection shows that this fall will have little effect on student numbers for several years after that date.

However, although the DES now admits that demand for higher education is likely to be more buoyant, it also warns that "if the number of places currently available were to be maintained, the supply of places would, sooner or later, exceed demand."

The new projection is likely to be criticized by some as still too pessimistic. The DES has based its figures on the assumption that the number of overseas students will stick at the present total of 46,000, despite the recent Government U-turn, and that the proportion of mature to young entrants will remain the same.

But the department does assume that there will be some increase in demand for higher education among qualified young people because of high unemployment. The paper points out that the proportion of those qualified who get places, has increased from 85 to 88 per cent since 1979 and is now nudging the record figures of the late 1960s, and that during the same period unemployment has gone up from 1.5 million to more than 3 million.

However the DES believes that unemployment has the opposite effect on mature students. "Current evidence suggests that unemployment has caused mature entry rates to fall, perhaps because potential entrants would prefer to retain their existing employment rather than risk unemployment following a spell of full-time higher education."

These new DES figures cover full-time and sandwich students only. No estimates have been made of the future demand for part-time courses and more generally for continuing education.

The last long-range projections of student demand were made by the DES in early 1979 in the paper *Future Trends in Higher Education* which was published for a conference organized jointly by the department and *THESE* and which updated figures given in the 1978 discussion document *Higher Education into the 1990s*.

Future Demand for higher education in Great Britain: DES Report on Education Number 99, available, free, from the Publications Despatch Centre DES, Government Buildings, Honeywell Lane, Stanmore, Middlesex HA7 1AZ.

Leader, back page



The Open University was treated to its own preview of the film *Educating Rita*, which has its premiere next week in London. The star, Julie Walters, who plays an OU student, is seen with Mr Jo Cliché, the university secretary.

Tories pledge to protect Oxbridge entry system

by Paul Flather and David Jobbins

The Conservative Party has warned its political opponents it will fight any attempt to interfere with Oxford University's autonomy if they demand positive discrimination in favour of entrants from state schools.

In the party's evidence to the Dover committee, which is examining Oxford's admissions procedures, Mr Cecil Parkinson, the party chairman, says it would support efforts by the university to attract the most able students from state schools.

"However we are opposed to any form of positive discrimination in favour of maintained schools. If any political party sought to interfere with Oxford's freedom to choose its own candidates or insist on positive discrimination we would do our utmost to protect the autonomy of the university."

Embarrassed Conservative Central Office officials were forced to withdraw a press notice accompanying Mr Parkinson's evidence which wrongly alleged that the Labour Party, which has already made its submission to

Dover, advocated positive discrimination.

Labour called in its evidence for the abolition of the seventh-term special entrance examination, more offers to schools which could not give special coaching based on an interview and two A level passes, and more experiments to draw in the able from different backgrounds.

The party said it was not intent on a war of attrition against Oxford and did not seek quotas. But it did want a substantial shift away from private school entrants, and saw reforms as long overdue.

Labour saw a target of 70 per cent state school entrants by 1990 as reasonable and attainable. Currently just under half are from state schools, well below the average for other universities.

Elsewhere in the Conservative Party evidence, Mr Parkinson says that nothing should be done to detract from the university's efforts to pursue academic excellence.

College admissions procedures should select candidates who can both

continued on page 2

was 3.5 per cent - later upped to 4.25 per cent. Under further pressure, Professor Maurice Shock, chairman of the University Authorities Panel, increased the offer to 4.5 per cent on the understanding that it would be formalized if the AUT indicated it would accept it.

Although it was rejected at that stage, by union negotiators, the offer remains in the wings pending the outcome of today's discussions. Even then Professor Shock admitted there will be some difficulties in selling the package to his fellow vice chancellors.

Facing her first round of negotiations as AUT general secretary, Ms Diana Warwick recommended rejection of the offer, according to more money was unlikely, but holding out for an improved package.

University lecturers' union leaders today discuss whether to accept a 4.5 per cent pay offer which also offers the possibility of improved promotion prospects for many staff.

The package deal has been discussed behind closed doors by union and university employers' negotiators and has been rejected by the union side in the hope of winning further concessions at further talks yesterday.

Leaders of the Association of University Teachers accept that the vice chancellors have gone as far - if not further - than they can afford under the 3.5 per cent cash limit regime but were hoping for further progress on key structural parts of the package.

These are special treatment for young lecturers by raising the age point from 26 to 27, payable on the fourth point of the scale rather than the third; deletion of the first point of all scales and joint pressure on ministers at Secretary of State level to increase the proportion of senior lecturers in each university.

Meanwhile, polytechnic and college lecturers' pay talks remained deadlocked this week. After nine hours of informal talks, the local authority employers remained adamant that claims for structural improvements including automatic progression from the Lecturer 1 to Lecturer 2 grade should be left to a review of the salary structure.

Schoolteachers have accepted 4.98 per cent - and a similar offer is waiting for lecturers if they drop their structural claims. But union leaders regard these as an integral part of a package which cannot be negotiated separately. They are expected to review the position before the next meeting of the Burnham further education committee fixed for next Friday.

Youth scheme threatened, say councils

by Patricia Santinelli

Lack of funds for colleges from the Manpower Services Commission and lack of information about the number of places it will offer under the Youth Training Scheme is threatening its future and quality, according to the Association of County Councils and the Association of Metropolitan Authorities.

The ACC is seeking a meeting in May with ministers at the Department of Employment and the Department of Education and Science to find a solution. If nothing is resolved it will once more approach the Department of the Environment about exemption from penalties bound to be incurred as a result of funding the YTS.

In papers forwarded to the House of Commons Select Committee on Education, Science and the Arts, both associations say that the £50,000 capital grant is far too little, and will still be inadequate when it is raised to

£100,000. This is a new unofficial level negotiated with the MSC.

The ACC believes that this should be raised to at least £150,000, while the AMA has suggested £250,000. However the Treasury has turned down this amount.

The associations are worried because inadequate funding has prevented colleges from acquiring additional buildings or classrooms. Because funds can only be spent on buildings, not equipment, colleges fear that they will not be able to provide adequate training, for example in new technology.

In addition, the fixed amount per college is penalizing the larger colleges which were created in the interests of efficiency and cost-effectiveness.

According to the associations, local authorities are attempting to rectify underfunding out of their own budgets but are both worried and reluctant because of the penalties they may incur.

The associations also argue that the planning of courses and quality of training is being jeopardized by the MSC's insistence on an employer-led scheme and the use of local authorities as last resort. This has meant that authorities have not yet been told the number of places their colleges should offer under YTS Mode B courses. These are schemes sponsored by voluntary agencies or local authorities.

In its paper the ACC cites Gwent authority, as typical of the conditions others face. The Gwent MSC area manager is so convinced that he will find 3,000 Mode A places sponsored by employers - a figure the authority says should be halved - that he refuses to allocate more than 350 Mode B courses to the area's colleges.

Gwent has not yet been told how many places it can expect to offer under Mode A courses. Under an agreement with the Confederation of British Industry, authorities are expected to provide 70 per cent of the

training under Mode A. A further worry is that MSC payment for Mode B courses has not yet been agreed.

The authority says it is in an awkward position where it is forced to assume a certain amount of expenditure and number of places on the basis of "guesses".

It has estimated that to run the YTS properly it will need to hire an extra 44 full-time equivalent staff and around 25 to 30 technicians and administrative staff, at an annual revenue cost of £500,000.

● The Government's advisory body on teacher training has urged the DES to issue an immediate statement on staff development for the YTS to halt growing confusion.

The Advisory Committee for the Supply and Education of Teachers says that the separate growth of staff development through MSC-accredited centres has left the education service confused about its role.

Inquiry brought forward

by Felicity Jones

An investigation by Her Majesty's Inspectors into the applied social studies and sociology courses at the Polytechnic of North London - subjects of a complaint over alleged letting bins - has been brought forward.

These courses, along with a European studies course were scheduled within the HMI's three-year investigation of over 100 degree courses in the maintained sector. Before the complaint to the Council for National Academic Awards, was received, the diploma in social work had already been looked at but the investigation of the sociology and applied social studies degree courses has now been brought forward by six months or so.

The HMI's further study, however, originally was to do with concern over training social workers in parallel with the degree course. On defect of the course is that only half the students can get the required training place.

Dr David MacDowall, PNL's director, said that the inspector's visit was only partially coincidental but that the visit had been brought forward by six or nine months. He added that several other courses were also being studied, including the science and engineering and European studies degrees.

The polytechnic is awaiting an official letter from the CNA's chief officer Dr Edwin Kerr which will outline suggestions for resolving what is to be done over the complaint made by a former member of staff. Concerning Marxist bias in the courses, it went with an appendix to Lady Caroline Cox, the Conservative peer and previous head of the sociology department, to the CNAA with a copy to Sir Keith Joseph, the education Secretary of State.

The polytechnic's management has always been assiduous in pointing out that the complaint was not made to PNL directly. The CNAA letter will go before the polytechnic's academic board in May and Dr MacDowall said that there might or might not be an inquiry as a result.

"The allegations against the applied social studies and sociology courses are complex and it will be up to the academic board to consider them formally," he said. Informal tripartite discussions have been held over the past few weeks between the polytechnic, the Department of Education and Science and the CNAA.

Poly denied research cash

The Engineering Council and the Science and Engineering Research Council have rejected requests to fund research at Leicester Polytechnic aimed at solving problems of engineering education.

The Leicester team believes this was because the council fear that its work would raise too many awkward issues, especially for the Engineering Council.

Mr Geoff Beuret, the director of the proposed study, said this week. "We would expect a research programme like ours to expose difficulties and problems of engineering education, and some people may be reluctant to have these exposed; perhaps because they are in education establishments or engineering institutions."

The Leicester researchers were surprised by the decision because the Council for National Academic Awards has already promised £50,000 to cover half the cost of a follow-up to their recent report on engineering education. They were only seeking £12,500 each from the SERC and the Engineering Council.

One engineering company has already refused to provide funds for the study as a result of the SERC decision, although other possible backers may still come up with the extra £30,000.

The SERC's rejection letter argued that the situation in engineering education was too fluid to justify a £100,000 study while the Engineering Council says it wants to conserve its limited resources for its own research, yet to be defined.

Programme for computers

by Jon Turney
Science Correspondent

Funding for university computers should be switched to provide more teaching and less research, a national working party has decided. Its report will be considered soon by the Universities' Computer Board.

The board, which is funded directly by the Department of Education and Science, spends £30m a year on university central computing facilities, including the two large university regional computing centres in London and Manchester.

At the moment, only around 10 per cent of this sum goes on equipment used for teaching, with the remainder contributing to research. Other uni-

versity computers, for administration and research in individual departments are paid for by the University Grants Committee or the appropriate research council.

The working party now finalizing its report is chaired by Dorothy Nelson of Hatfield Polytechnic. It was set up because some board members were concerned at the proportion of their total allocation spent on research machines when there are other sources of funding for the main beneficiaries of this part of the budget.

The group is exploring the needs of university teachers in disciplines outside science and engineering for access to computers, in the belief that they could make greater use of computing power.

There are problems with such a study because some machines have multiple uses, and some universities are unable to specify exactly what all their computers are used for. In addition, computer time used by research students is hard to fit into a simple teaching/research classification. But the results of approaches to every university have confirmed that research takes the major part of the board's money.

The group is now almost certain to propose a shift in this balance in favour of teaching when its report goes before the board next month. It may also argue for more money overall, hoping to the advantage of the DES's current enthusiasm for information technology.

Benenden stoops to conquer

by Felicity Jones

Benenden - the school Princess Anne went to - held an open day to present the higher education opportunities available to pupils at polytechnics for the first time at the weekend.

Parents and sixth formers at the girls' public school in Kent heard representatives from Leicester, Portsmouth, Middlesex, Bristol, Brighton, Hatfield, Kingston, South Bank, Thames and City of London polytechnics and three colleges of higher education.

Miss Janet Allen, the school's headmistress, said afterwards she thought both parents and pupils had been impressed by the variety of courses available at the polytechnics and particular interest was shown in the modern languages with international studies and European business administration courses which were available.

"We have sent girls to polytechnics over the years but we felt that the girls needed more assistance with the opportunities available. There is particular interest in those courses with a practical leaning," she said.

A spokesman for Leicester Polytechnic said he thought this demonstrated the double stereotype that girls do not do technical things and do not go to technical colleges. He thought the quality of the courses was now overriding any preconceptions about polytechnics as institutions to which you did not send your daughter.

Mr Julian Ayer, head of the careers, placement and liaison service at Middlesex Polytechnic said: "The fact that one of the top girls' schools is showing interest in the polytechnics shows the value of the courses and the realization that it is not just the few high-flyers amongst girls who go to Oxford or Cambridge who want higher education." He thought the more practical, less academic content of the polytechnic courses was an additional attraction.

It was those practical courses in hotel and catering management and European business studies which were not offered in universities which prompted the most interest at the open day.

One of the reasons why girls' public schools are taking more interest in the careers and education prospects of pupils is the competition posed by the boys' schools which are recruiting girls into their sixth forms. This is forcing girls' schools to take an active part in career advice so as to make themselves more competitive.

Sapper soft-pedals into retirement

Mr Laurie Sapper, for the past 14 years general secretary of the Association of University Teachers, retires today. But the piano lessons he promised himself will have to wait - he faces a busy schedule as a member of the Committee of Inquiry into the Ford (Halewood) dispute and other inquiries later in the summer.

He is being succeeded by Ma Diana Warwick, who takes over fully as general secretary on Tuesday. Mr Sapper said: "I shall miss all the people I have worked with, but I shall miss the job. I don't think I shall miss the job."



The present meets the past at Queen Mary College, London. Archaeologist Kevin Flude (left) demonstrates the use made of microcomputers at a recent dig in the City of London to Dr John Stratford, of the college's computer centre. The demonstration was part of a QMC open day on arts and computing held this week to show the wide range of computer-based facilities now available to arts lecturers, researchers and students. Among the other projects exhibited were the logging of a Burmese dictionary, two university typesetting systems and computer packages for teaching modern languages.

Council reviews workload as pursestrings tighten

by Paul Flather

The national social work training council is preparing to review its range of activities because it is unable to keep within its budget.

The Central Council for Education and Training in Social Work is particularly worried about the increased workload caused by the 1982 Mental Health Act. It has only got a 4 per cent increase in its £2.2m budget to cover for 1983/84.

But it now appears that the council will avoid having to renege on any of its statutory duties, as it first feared. It sent a letter to ministers last winter warning that after two 10 per cent budget cuts in three years, it was reaching a point of no return.

Dr Harry Kay, chairman of the council, and vice-chancellor of Exeter University has welcomed some ministerial recognition of the council's difficulties. But he warned that priorities would have to be kept under review, given the cuts and inadequate allowances for inflation.

The council is now looking for savings in its national planning structure, including its five regional offices; its already reduced validation work which will mean longer intervals between course reviews; and its post and pre-qualification work. Details are expected shortly.

Support the Open Tech, says Tolley

Colleges should play a much greater part in the Open Tech programme according to Dr George Tolley, the head of the Manpower Services Commission Open Tech Unit.

Speaking at the Open Learning Federation's annual conference in London, Dr Tolley said that many colleges had already suggested projects but much more needed to be done.

Protests mount over social science closure

by Olga Wojtas
Scottish Correspondent

Opposition is mounting to the Scottish Office decision to axe social science at Paisley College of Technology and probably transfer its social studies courses to other colleges.

Staff involved are urging the Scottish Education Department to hold a public review of the courses' future, and the Political Science Association, and the British Sociological Association, and the Central Council for the Education and Training of Social Workers are all pressing the SED to reverse the decision.

The SED says a redeployment of resources within Paisley away from social science "will further enhance the college's reputation as a centre of technology responsive to modern industrial requirements."

But Professor John Foster, head of the politics and sociology department, claimed that Mr Alex Fletcher, Scottish Office minister for industry and education, was "flying in the face of all recent reports on what British industry needs". Studies such as the Finniston report on engineering and the Alvey report on information technology showed a clear role for social science in future industrial development.

"The decision involves a serious

issue of principle in that it was taken without any review of a public character," said Professor Foster. "The policies which developed the present courses were sanctioned and approved by the SED over 15 years, and we do believe a public review is necessary."

The proposals were also denounced at Rothesay last week. Mr Jack Dale, secretary of the Association of Lecturers in Scottish Central Institutions (ALSCI), told the congress that the proposals were "the latest lunacy in Scottish higher education. The cuts show the deep hostility to social science in the Government, they are determined to prevent the spread of genuine social understanding."

The politics and sociology department is most at risk and Mr Fletcher has denied allegations of political prejudice against the department and Professor Foster, a leading Marxist intellectual and member of the Communist Party.

Mr Dale said: "Professor Foster conducts himself with the utmost decorum and is highly respected by his staff. Allegations of political bias are nonsense. It's a balanced course and teach Karl Marx on some courses and right-wing economics on others."

BRITISH GAS ENGINEERING RESEARCH AWARDS, 1983.

British Gas supports post-graduate research at Universities and Polytechnics through its long-established Research Scholarships, and through its Engineering Research Awards, established last year.

Three Engineering Research Awards will be made in 1983, to support postgraduate engineering research in Universities and Polytechnics in the United Kingdom.

Attractive financial aspects of the Award include: a maintenance allowance for the research student comparable to a fully "topped-up" Science and Engineering Research Council CASE Award (currently up to £4225 p.a. for a student living in London); a book allowance of up to £200; and an opportunity for the student to make one technical visit abroad. There is also an annual equipment allowance for the Department of £1100.

The topics from which this year's Awards will be chosen by British Gas are as follows:-

- 1) HEAT EXCHANGER DESIGN FOR HIGH EFFICIENCY GAS APPLIANCES.
- 2) NOVEL TECHNIQUES FOR METERING GAS FLOWS.
- 3) THE EFFECTS OF TURBULENCE STRUCTURE IN ULTRASONIC FLOW-METERING.
- 4) HEAT TRANSFER ENHANCEMENT IN TWO DIMENSIONAL LOW REYNOLDS NUMBER DEVELOPING FLOWS.
- 5) AIR ENTRAINMENT INTO COLD DENSE VAPOUR CLOUDS.
- 6) UNDERGROUND LOADING OF PIPES.

Specific proposals are invited from Heads of Engineering Departments of Universities and Polytechnics relating directly to one or more of the above topics. These proposals should be sent to the Manager, External Affairs, Research and Development Division, British Gas Corporation, 326 High Holborn, LONDON WC1V 7PT, from whom further information may be obtained. The closing date for applications is 31st May 1983.

BRITISH GAS

Policy makers 'don't learn from the past'

by Jon Turney
Science Correspondent

Science policy makers in Britain make little use of techniques for monitoring past performance when allocating funds for new work.

This conclusion, from a report by the Science Policy Research Unit at Sussex University, is based on interviews with senior officials of the major funding agencies and research directors in universities and research council laboratories.

However, the authors, John Irvine, Ben Martin and SPRU's director Geoffrey Oldham, also found that their interviewees felt a need for new initiatives to find ways of assessing research, to augment the present system operated by the Advisory Board for the Research Councils and the University Grants Committee. Their decision-making was described by one anonymous informant as based on "the informed prejudices of wise men" with little formal analysis.

The SPRU authors report that some of the policy-makers they approached were completely unfamiliar with international research statistics now compiled by agencies like the US National Science Foundation, and they suggest that "few had a full understanding of their possibilities for policy purposes".

The report is particularly critical of the UGC, which, it finds, took almost no account of research performance in

determining the distribution of the university spending cuts in 1981/82.

Ironically, the report, one of a succession of comments from SPRU on science policy evaluation, was commissioned by the French Ministry for Research and Industry.

In this country, by contrast, there has been little enthusiasm so far for work of this kind. Martin and Irvine have argued that citation analysis and extensive interviewing across a scientific speciality can yield reliable information on the relative performance of large establishments. Their own latest paper, published last week, found for example that the Science and Engineering Research Council's election synchronisation NINA was expensively unproductive.

The new report seems to indicate that British policy-makers are more receptive to this work. But the interviewees in this study were almost all administrators and civil servants - in the UGC, ARCC, Department of Education and Science and the research councils - rather than scientists. So this may simply indicate that the professional managers are unhappy with a peer-review system heavily dependent on expertise held only by scientists.

Research Evaluation in British Science: A SPRU Review, Science Policy Research Unit, University of Sussex.

Big ideas for big projects, page 12

Tory pledge to Oxbridge

continued from front page

contribute to and profit from the life of the university, and who are suited by natural aptitude and previous training to academic study at the highest level. "In the past such criteria were not always applied. Unsuitable candidates sometimes succeeded for reasons irrelevant to the proper purposes of a great university," Mr Parkinson said.

Conservatives and all those who cared for the continued intellectual prosperity of Oxford must wish to ensure that such weaknesses were eradicated, he added. "We are aware that at present many candidates from maintained schools are unduly deterred."

The 14-member committee under Sir Kenneth Baker, president of Corpus Christi College, Oxford, has almost completed its deliberations and a consultation document is expected at the end of May. "Evidence is still coming in, but it is unlikely anyone will now come up with anything totally new," Sir Kenneth said this week. No evidence has come from the Liberal/Social Democratic Alliance.

In there class bias, page 13

College reprieve?

Officials from the Department of Education and Science have told De La Salle College in Manchester, which is threatened with closure, that it may reconsider its decision after the case has been heard in open court towards the end of June.

Prisons need more local help, say MPs

Local education authorities should increase the level of support given to prisoners, education departments and all prisoners should have the right of access to education, according to a House of Commons Select Committee report published this week.

The report from the Select Committee on Education, Science and the Arts calls for a new Prison Regimes Act to embody the educational rights of prisoners.

"Education is the final objective of the regime and needs to be promoted forcefully at all levels," the committee says.

Prison Education, first report, House of Commons paper 45-1, price £6.50 from HMSO.

Overseas support 'merely psychological'

The Government's £46m package of support for overseas students was dismissed this week by the author of the report which inspired it to be of largely psychological, rather than practical value.

Professor Peter Williams, whose report for the Overseas Student Trust to the Government's Initiative, told backbench MPs he welcomed the package, even though it fell short of his recommendations. "But he added: "This decision represents a psychological turning point rather than anything else."

The fall in the value of the pound has been far more helpful for the majority of overseas students, who were still



Four part-time students at West-Bromwich College of Technology have won top awards from the London Academy of Music and Dramatic Art. Numbers on the college's speech and drama courses are booming despite high unemployment in the region, as some students seek interview skills. The four prizewinners pictured (left to right) are teacher Anita Rybninski, factory worker Ryan Mellis, teacher Hazel Wall, and Robert Hipkins, an unemployed former storekeeper.

Croydon staff dismissed in bid for longer teaching hours

Dismissal notices are being sent to all 287 teaching staff at Croydon College in an effort to enforce the local education authority's aim of longer class contact hours.

The lecturers are being given three months' notice from May 31 - but offered new contracts which contain the changes in conditions of service which the local authority first demanded last year.

This week, Croydon's education committee voted first to increase all lecturers' class contact by two hours to the maximum permitted by a national agreement and secondly to abolish a practice under which teachers may spend half the difference between their teaching hours and notional maximum 30-hour week away from the college.

The National Association of Teachers in Further and Higher Education at the college has told its members not to sign new contracts and has withdrawn a concession, under which staff were prepared to work more than their class contact time when invigilating examinations.

Branch secretary Mr Eric Nash rejected suggestions the union had been dragging its feet in negotiations. "We had to force the authority to the negotiating table in November and it has been recalcitrant in negotiations since then."

Mr Donald Nalmsmith, Croydon's director of education, said: "We are available for further negotiations at any time."

Lecturers employed by the Labour-controlled Brent education authority have halted preparation for Youth Training Scheme courses due to be introduced in September in protest at the decision to withdraw 28 civilian staff from Hendon police cadet training school.

Meanwhile, the Advisory, Conciliation and Arbitration Service is arranging talks between Matthee, Brent, and the Metropolitan Police in an effort to solve the dispute which began when Mr John Fernandes, a lecturer at the school, was barred (for revealing racist remarks) from the media.

The United Kingdom Council for Overseas Student Affairs, giving evidence at the same session, called for a new Government initiative to establish a panel to be established to advise the Government on fees. A meeting had already taken place with junior ministers.

● A Bill was introduced last week by Sir Keith Joseph, Secretary of State for Education and Science, to restore the previous definition of an overseas student for the purposes of tuition fees.

The Bill makes no mention of, or any payment to those wrongly charged overseas fees in recent years. But Sir Keith was expected to rule out any possibility of a refund, or a second ruling on Wednesday.

News in brief

Survey forecasts 1,000 new jobs

About 1,000 new jobs will be created for lecturers in further education according to a survey of jobs, pupil numbers and spending plans for 1983-84 conducted by *The Times Education Supplement* in 74 authorities in England and Wales. In the financial year just ended college staff increased by 500.

The survey shows overall that half the authorities are actually planning to spend more in real terms on education than in the previous 12 months in spite of the fact that everywhere the number of pupils aged under 16 is falling in primary or in secondary or in both. Fifty per cent of the sample plans a cut in real terms while 10 per cent have budgeted for a standstill.

Some are planning growth even though they will suffer grant penalties for alleged "overspending". But those cutting back are also getting caught in the Government's trap. Altogether two-thirds of the authorities will break spending targets and as a result incur penalties.

Business merger

The Scottish Business Education Council and Scottish Technical Education Council have recommended that they should merge into a new Scottish Vocational Education Council (SCOTVEC) from the start of next year.

The proposal that the new council should run all vocational courses and examinations not covered by the universities and the Council for National Academic Awards comes after two years of discussion and the merger of TEC and BEC south of the border.

Financial flow

The Chartered Institute of Public Finance and Accountancy has set up a group of users and potential users of its Financial Information System for Institutions of Higher and Further Education in the Maintenance Sector to provide a flow of information between accountants, educationalists and colleges.

Crafty chance

A £900,000 scheme to encourage adults to train as teachers in craft, design and technology was launched by the Department of Education and Science this week. It offers 180 cash awards of between £75 and £100 a week to people aged between 26 and 50 with suitable qualifications and possibly experience of industry.

World champions

Two members of Glasgow University's Dialectic Society, Mr John Nicolson and Mr Frank McKinnon, have won the world debating championship held in Princeton, New Jersey, with another Glasgow student, Mr Michael MacFarlane, winning the individual speaker prize.

Past masters

A new acronym is about to surface at Oxford University. Students successfully completing a new one-year taught graduate course in arts subjects will be awarded an MSt or Master of Studies. The degree, equivalent to the existing one-year MSc taught course, is aimed mainly at attracting more overseas students to Oxford. All arts faculties have been asked to submit MSt courses. So far two, in Jewish Studies in the Graeco-Roman period and in Syriac Studies, have been approved.

Head for UGC

Mrs Tydfil Thomas, headmistress of the Girls' Comprehensive School, Aberdare, Mid Glamorgan, has been appointed to the University Grants Committee. Her term of office will run until April 1988.

Nalgo campaign

The National and Local Government Officers Association, which numbers thousands of university and college staff among its members, this week launched a massive campaign to alert the public to the threat of privatization and the value of public services.

Social scientists in 'new blood' protest

by Paul Flather

Social scientists have protested about the way the recent "new blood" and information technology allocations discriminated against the arts and in favour of science and technology.

Many feel that to protest now is one of the only ways to try and force changes in the system before the race for next year's awards begins in the autumn.

The Association of Learned Societies in the Social Sciences (ALSIS), which represents more than 20 societies, has written to Sir Keith Joseph, the Secretary of State for Education, saying it would be a "lapse of judgement" on its part if it did not point out its opposition to the Government's "prejudiced" view.

An extra 312 university posts are

being funded this year for young researchers by the University Grants Committee - 17 in the social sciences, 15 in the arts, 70 in information technology, and 210 in natural sciences. Next year, there will be 300 "new blood" and 30 information technology posts.

ALSIS is particularly angry that information technology posts are being totally diverted to the hard sciences. It says in its letter the whole "applications area" has been ignored, as well as the study of topics such as training, and man-machine relations.

The 70 posts were handled almost entirely by the Science and Engineering Research Council, and funnelled into basic "enabling" research. ALSIS then goes on to deride the miserly allocation of arts awards.

"The new blood proposals are essen-

tially arbitrary," it says. "They are based on the prejudice of the Government that science and technology is more important than arts (which includes social sciences), and that research in these subjects must be encouraged."

The anger of social scientists has been fuelled by the fact that £on was lopped off the Social Science Research Council budget to help fund the £100m three-year package of awards. They are also irritated that Sir Keith wants the word "science" dropped from the SSRC title.

Interestingly, the Department of Education and Science announcement scrupulously referred to 17 new social studies posts, but its tables described the awards as 'social or social science'. The breakdown works out as five economics posts, two each in politics,

psychology, geography, and social affairs, one each in law and linguistics, and two general multi-disciplinary. A handful of awards are also hidden in the science quotas, particularly in the 43 medicine posts. Bath and Southampton won two awards each.

The full list: Bath (political economy of welfare, and the export performance and financing of UK firms); Exeter (middle East politics); Leeds (geographical location analysis); Leicester (social welfare law); University of Manchester (international resource markets); Newcastle (comparative science); Southampton (international relations and security studies and the marketing of open economies); University of Wales Institute of Science and Technology (human problem-solving under industrial stress); Sussex (measurement of science and technology activities); York (public sector and the effect of unemployment in south Wales) (Edinburgh (economics and cognition); Glasgow (housing economics).

The breakdown works out as five economics posts, two each in politics,

Heath agrees to address AUT council

by David Jobbins

Mr Edward Heath, the former Conservative Prime Minister, will address the summer council of the Association of University Teachers in London next month.

The former party leader, who is known to be critical of many aspects of the Government's higher education policy, is delivering a series of speeches on the issue. At the AUT he is expected to deal with the question of the binary divide and the relationship between universities and the polytechnic.

His acceptance of the invitation is a coup for the AUT in the run-up to the general election. Union leaders believe that capturing Mr Heath's attention will draw wider attention to the problems facing the higher education system. Last year the guest speaker was Mr Len Murray, the TUC general secretary.

The AUT is stepping up its political activities in preparation for an election in June or October. It intends to focus particular attention on Parliamentary seats where the university vote - including students as well as staff - could play an important part in determining the result.

The union is displaying a non-partisan approach, recommending that local branches invite candidates from all the parties to open meetings either in cooperation with other campus unions or through the Education Alliance.

But the summer council will discuss a move to set up a political fund to further the union's campaigning for higher education.

A motion from Edinburgh urges a ballot of the 34,000 membership on establishment of a political fund "to ensure that the association's policies on higher education are presented effectively to all political parties".

One from Birmingham says the union should pursue the logic of TUC affiliation and institute a political levy. It adds that it should be made clear to members that they have the right to contract out of paying the levy and that its establishment "implies no support for any political party".

But union leaders are likely to resist the proposals, arguing that they are unnecessary to further the association's existing non-partisan campaigning. They would only be needed in the unlikely event of a decision expressly to support candidates of one party rather than another in an election.

Other motions include an attack on the appointment of Sir Peter Swinnerton-Dyer as chairman of the University Grants Committee.

A further motion, from Newcastle, expresses severe reservations about last year's adoption of a motion calling for unilateral nuclear disarmament. The battle over a permanent career structure for research staff will be resumed, with a motion from Guy's calling for urgent action.

The Scottish TUC in Rothesay last week adopted an AUT resolution condemning the use of short-term contracts in place of established permanent jobs. It called for an end to waiver clauses which permitted employers to sign workers on short contracts to sign away their rights to redundancy pay and protection from unfair dismissal.

Shelton hints at conflict over body

by Karen Gold

Ministers will decide whether or not to set up a new national adult education body before the end of next month. Mr William Shelton, under-secretary of state for education, promised at the National Institute for Adult Education's annual conference.

His decision on the future of the Advisory Council for Adult and Continuing Education and the continuing education development council it had said should succeed it would be announced before then, he said.

But Mr Shelton refused to be drawn on what kind of body it would be established and warned that the continuing education lobby was unlikely to be entirely happy with the result.

"This (any new body) would be entirely your body, to represent you," he told the NIAE. "It will only be fully under your control and speak for you if you set it up, guarantee it and support it yourselves."

"If we set it up, we will want it to note and reflect our concerns as well as yours, and sometimes because of wider Government policies these do not always directly coincide."

The crucial need in educating adults, as recognized by the Government, was related to the changing skills needed to adapt to new technology, he said. "We have to prepare adults not only to withstand the aftermath of one technological revolution, but to acquire the

skills necessary to cope with the next, and to bridge the inevitable trough in between."

"This means not only developing new skills, but maintaining and improving general educational levels of attainment on which to base them, because skills cannot exist in a vacuum. They have to be based at the very least on literacy and numeracy, but much more too," he added.

The concerns of the Department of Education and Science and the Manpower Services Commission - particularly as expressed in the MSC's latest document *Towards an adult training strategy* - were complementary, he said.

The MSC's projected spending on adult training was £280m, largely re-directed from the Training Opportunities scheme, he said. Figures for DES spending on education for adults in England, obtained for the first time, amounted to £750m in 1982/83.

Only £70m of that was directed towards the local authority adult education service however; another £320m spent by local authorities was for adults within the further education system. Universities were calculated as spending £200m on adult students; the Open University received £57m; responsible bodies - extra-mural departments and the Workers' Educational Association - £11m; and student grants to adults £89m.

Adults or youth: who first?

If educational resources are limited, should 18-year-olds' opportunities be cut back in order to increase adult places, the conference was asked.

Definitely yes, said Mrs Pam McNay, president of the Open University Students Association, "It's a divisive question," she admitted. "The only way to live with it is to recognize it would be an increase in opportunities for everybody, provided we are sure the resources are shifted and not lost."

"If you reduce the number of 18-year-olds, and those 18-year-olds know they can have an education at some time, I don't think that's as bad."

But Professor Bernard Jennings, of Hull University, said such a policy would create too much opposition within higher education institutions. Eighteen-year-olds would soon be turned away from higher education anyway, he said.

"We need not alienate people. We must convince them that they need to take a broader view of higher education," he added.

Mr Alan Wells, director of the Adult Literacy and Basic Skills Unit asked how the country could cater for the 18-year-olds who would be ousted by adults. "One of the problems of that kind of age group is they are massively affected by unemployment. You can't put them all on the Youth Training Scheme," he said.

Describing the discussions of one of the nine groups held during the conference, Professor Jennings said that the NIAE should be monitoring the effect of cutbacks on mature students enrolling for higher education.

"As the cutbacks grow the mature students will be squeezed out in order to accommodate as many people as possible born in the bulge," he said.

Archaeologists unearth publishing venture

Two Oxford archaeologists have started to publish and distribute their own books in a positive step to get round the problem of publishing costs and delays.

Professor Barrington Cunliffe, of Oxford University's Institute of Archaeology, has been able to make use of computerized typesetting equipment at the university to print and publish new research. Oxford University Press is unable to produce books in very small runs and the traditional offset-type alternatives remain unsatisfactory and unattractive.

At the same time, Mr David Brown, an assistant keeper in the Ashmolean Museum's department of antiquities and one of the editors of the journal *Anglo-Saxon Studies*, has launched his

own archaeology book distribution service. The venture began modestly with an original listing of 10 books but the first issue of *Oxbow Book News* lists nearly 70 books, 45 of them from archaeological institutions and departments, and it has been mailed to 1,500 individuals and 400 libraries.

The forthcoming third issue of *Anglo-Saxon Studies* will be typeset on the university's equipment. Future plans include conference papers and individual monographs. Mr Brown said: "OUP simply weren't interested in small runs of 500 up to 1,000 copies and we now have the university's permission to publish these from the Institute of Archaeology."

Oxbow Books hopes to make a profit by distributing commercially-published archaeological books. But the bulk of its first listing consists of papers produced by archaeological societies and university departments all over the country as far afield as East Anglia, Leicestershire, Yorkshire, Kent, and the West Country.

Mr Brown stressed that Oxbow Books was a natural extension of a successful local experiment. "If you do one publication, you might as well do two, or 20. We're concerned mainly with sales to colleagues and distribution is obviously more efficient for a little organization that consolidates buying, listing and advertisement. They also aim to hold a small stock of publications that would otherwise go on of print and become unavailable."

Overseas students change delays guide

The Scottish Education Department Guide to Student Allowances has not been published because of uncertainty about overseas students grants.

Last month, Sir Keith Joseph, Secretary of State for Education and Science, made changes in awards regulations preventing overseas students claiming ordinary residence if they are in the UK primarily to receive full-time education.

In England and Wales, grants are made by the local education authorities who have been told by Sir Keith they are not required to pay mandatory grants to overseas students.

But while Scotland must apply simi-

lar rules, grants come direct from the Scottish Education Department at the discretion of the Secretary of State for Scotland.

Mr George Younger, the Scottish Secretary, has been taking legal advice on whether new regulations are required, but this is not yet clear. The annual booklet on grants is being delayed until up to date information on overseas students awards can be included.

Students can apply for grants once they have a firm offer of a place, and the SED say they are accepting grant applications, but it is likely many

Medical researchers 'suffer most'

By Jon Turney
Science Correspondent

Researchers are the main victims of the University Grants Committee cuts in medical schools, judging by first results from a survey by the British Medical Association.

The BMA and the British Dental Association set up a group to monitor the effects of the cuts on teaching and research late last year, soon after the government used figures from 1981 to answer charges from the House of Commons Social Services Committee that UGC cuts were having serious effects on the medical schools.

The monitoring group sent a questionnaire to each medical school to get more up-to-date figures, and has now compiled totals for February 1983 from the returns received so far.

The results show that clinical and pre-clinical academics have less time for research - because staff losses increase teaching commitments - and less money to fund their studies.

More than 90 per cent of the pre-clinical representatives who replied reported that time for research had decreased, as did 84 per cent of their clinical colleagues. And one in four clinical representatives and more than a third of pre-clinical respondents indicated that research groups or even whole departments had been lost as a result of the UGC cuts.

Research hit by the cuts was salvaged by raising funds elsewhere in 32 per cent of clinical departments, but only 9 per cent of pre-clinical departments found this possible.

However, most respondents still felt that indirect support for research from

the UGC was adequate, in spite of complaints about shortages of staff and equipment.

Two other, complementary surveys released at the same time show why research time is being eaten up by teaching and medical duties. A University Hospitals Association survey of 20 medical schools in England and Wales revealed 62 senior clinical academic staff posts lost up to last July, even though the full staff reductions needed to meet overall UGC financial targets have yet to appear.

A similar survey by the Federation of Associations of Clinical Professors shows 63 senior posts lost in pathology alone by September 1982, compared with the academic year 1979/80. The same group of specialists also lost 61 junior academic posts and 89 technical and clerical staff over the same period.

'Even-handed' funding claim challenged

by David Jobbins

Ministerial claims of even-handedness between the universities and the public sector are challenged in a claim this week by the Association of Polytechnic Teachers.

While the polytechnics' share of funds has fallen by more than the 8 per cent originally claimed, their share of students has increased, leading to a 24 per cent increase in "productivity" for the polytechnics and other local authority colleges, the non-TUC union alleges.

APT says that in view of the "abandonment" of even-handedness, funding policies should be reviewed by ministers as a matter of urgency.

It claims that between 1979/80 and 1983/84 the number of students in universities fell by 4.7 per cent; the number of students in local authority higher education institutions increased by 14.8 per cent; the university share of government higher education rose by 4.7 per cent and the local education authority share fell by 7.5 per cent.

Arguing that the per capita funding of university students increased over the period compared with their public sector counterparts, APT says: "Had there been equal funding for both types of institution in 1979/80, the changes would have opened up a gap between them equal to 33.2 per cent of the 1979/80 per capita allocation."

According to APT's calculations, the gap is widening to 20 per cent in the universities compared with 33 per cent in the public sector.

But between 1981/82 to 1983/84, while UGC allocations fell by 17 per cent in real terms, the cut in the universities was the 8 per cent predicted in repeated references to "even-handedness", says the APT.

The most serious cuts occurred in UGC institutions where students were in direct competition with the universities.

While the national advisory body on public sector higher education is viewing "with equanimity" the prospect of increased student-staff ratios of 14:1, the university figure will have reached only 9.2:1 by 1984/85 and while some universities have been "forced" to shed up to a staff, one polytechnic has lost 140 staff and others 30-40.

Polytechnic staff are lagging 6 per cent behind their university colleagues in the salary stakes, the APT, which has over 3,000 members in the polytechnics, alleges.

Joint ventures

Strathclyde University is to set up two new teaching companies with grants totalling more than £280,000.

In a unique venture, the Scottish Development Agency and Ethicon, the Edinburgh-based manufacturers of health-care products, have given Strathclyde's marketing department an initial three-year grant of more than £135,000. This will fund a teaching company between the department and Ethicon.

The university's department of production management and manufacturing technology has been awarded £145,000 over three years to work with Leyland vehicles.



Glasgow's Lord Provost, Dr Michael Kelly (above), examines a William Hunter bicentenary medal struck using medieval methods in Glasgow University's Hunterian museum. Dr Kelly opened a new coin gallery in the Hunterian as part of a series of exhibitions commemorating the bicentenary of the death of William Hunter, a former student and major benefactor of the university. The coin gallery publicly displays Hunter's 27m coin collection, showing the origin and development of coinage in ancient Greece, Rome and Scotland. It includes the head of Apollo from the fifth century BC (right).



University agrees to copyright guidelines

from E. Patrick McQuaid
CAMBRIDGE, Mass.

A massive lawsuit charging one of the nation's largest private universities with copyright infringements has been settled out of court with the university agreeing to curb future abuse among its teaching staff.

The action, brought in December by the Association of American Publishers on behalf of nine major publishing houses, sought an undisclosed award for damages and a permanent injunction against the New York University and nine individual professors who had allegedly photocopied and distributed course materials without the permission of the copyright holders. Also named as a defendant in the original suit was the Unique Copy Centre, a shop near the university's campus in Washington Square, Manhattan.

In exchange for dropping the suit, the university has approved internal guidelines concerning the duplication of copyrighted materials and for policing compliance among the staff. Action

against individual teachers, one of whom died recently, has also been dropped but negotiations between the publishers and the local copying shop continue, with court proceedings likely.

As part of the settlement New York University is agreeing to publish the new policy in the staff handbook and to investigate any cases of alleged abuse - reporting them to the publishers - promptly. The administration further agrees to "take appropriate action" against staff who are found guilty of copyright infringements. While such measures are left to the university they are to be "consistent with remedial or disciplinary actions" carried out when other university policies are violated.

Both parties have agreed to cover their own expenses stemming from the suit and the settlement. No figures were made public.

The publishers say they are content with the settlement, noting that they were not especially interested in taking their case to trial. The point of their action was to set a precedent, sending a message to other American colleges

and universities where duplication abuse is widespread. It is expected that many institutions will adopt similar guidelines. Yale and Johns Hopkins universities had voluntarily adopted such provisions.

The guidelines at New York concern multiple copies based on the length of the excerpts being used. The emphasis is on brevity. Teachers need not seek permission to copy 10 per cent or less of a prose work or 250 words of poetry, for example. The policy does not concern individual students who make copies for their own use.

A similar settlement was reached between the publishers' group and a chain of photocopying stores, the Gnomon Corporation of Cambridge, Massachusetts, which runs outlets near several campus locations throughout the northeast. Out of court settlements were also reached with a variety of private research firms where photocopying of scholarly material is prevalent.

Had the New York case gone to trial representatives from the country's

largest professors' union, the American Association of University Professors, and from the American Library Association say they would have sided with the university.

The publishers - Random House, Simon and Schuster, Houghton Mifflin, Addison Wesley, Alfred A. Knopf, Basic Books, Little Brown, Macmillan, and the National Association of Social Workers - say they will continue to aggressively pursue copyright violators at other universities. Under the New York agreement, teachers seeking to duplicate lengthy copyrighted materials must seek the permission of the publishers and supply them with specific information on how many copies are to be made and how they are to be used in course work.

Should a professor be denied permission to duplicate materials, a request to do so must be forwarded to the university's general council. Staff not complying with these measures will not be defended by the university should the copyright owners seek punitive measures.

Entrance exam put to test

by Sarah Jane Evans

As some 165,000 sixth-formers prepare to take the tests for university entrance in June a conference is being held at one of Madrid's universities to find ways of improving the current system of selection.

On the pattern of previous years, roughly 70 per cent of the candidates will probably pass the tests and will then be able to take up places at university this autumn. A few faculties now impose quotas on numbers, notably in medicine. Others suffer severe overcrowding, which led last autumn to angry demonstrations on the campus of Madrid's largest university.

But it is standards, not numbers which is at issue at the conference - funded by the Education Ministry and Madrid's Autonomous University. Lecturers argue that the current tests don't pick out the most appropriate candidates. This has the effect of reducing first-year university teaching to the dictation of notes to be learned by rote.

The sixth-formers are all students of a course known as COU (Curso de Orientación Universitaria). COU, like secondary education in general, has not yet undergone the reforms that have begun with primary education. Its formal style and content are blamed for the high drop-out rate (in the province of Catalonia, for instance, 35 per cent of secondary school students drop out before they get to COU). And those who do make it can find it difficult to adjust to the more independent study methods at university - which leads to a further substantial drop-out during the first year.

The selection debate goes back to 1938, and the Secondary Education Act. The state baccalaureate was then run by the universities and had written and oral sections. In 1943 a further law enabled universities to set their own entrance examinations and the ministry to set quotas of students.

The pre-university sixth-form course was introduced with its own examination, which supplanted all the others in the 1950s. This exam was based on the work that had been studied in the year, but was still of a very traditional kind. In 1974, the current system of selection was introduced: the language test was abolished, and baccalaureate results were given equal weight with the university tests. The interesting point to note is that between 1970 and 1974 there were - because of changes in the law - no university selection tests. The proportion of students who went to university stayed almost constant, and there were no major complaints about student standards.

The Institute of Education at Madrid's Autonomous University has been working to identify the qualities students need at university (such as the ability to work alone, to compare and assess different texts, to be able to express themselves, etc.). They find that it is just those things which the university preparation course, COU, currently does not provide, because, they say, universities were not consulted when the curriculum was compiled.

The conference on selection faces the problem that there is little room for manoeuvre. While the law still stands, the universities cannot make many changes. But the arrival on the scene of a new government late last year, committed to substantial changes in the existing education system, gives lecturers and students the confidence to act on long-standing discontents.

Union fears West German crackdown against 'extremists'

from James Hutchinson

A trade union representing West German university teachers is concerned that the new centre-right government may tighten the regulations banning political extremists from public service - a practice which has led in the past to the rejection or dismissal of many teachers and, in one widely-publicized case, to the sacking of a train driver on the grounds that he was a member of the Communist Party.

The union is particularly worried about a recent decree by the Bavarian government which requires civil servants to support decisions of the government and to steer clear of groups whose aims are "incompatible with the free democratic order". This rule, it is thought, is probably designed to deter

people from joining such organizations as the peace movement.

The German system of excluding extremists from the public sector is based on an agreement between the *Laender*, or states, in the early 1970s. It is interpreted with varying degrees of strictness from region to region, depending on the political colour of the local government.

A specialist in international law at Bonn University, Mr Christian Tomuschat, said that nearly all west European countries tried to keep extremists out of public service. But only Germany applied the same yardstick to both the "under-secretary and the grave digger." Elsewhere, he said, the chief consideration was one of security, whereas West Germany demanded loyalty to the constitution.

Government widens control

from Guy Neave

PARIS

Crucial changes in government control over higher education in France have been announced by M. Alain Savary, minister of education.

A new Superior Council for Higher Education will replace the temporary council hastily set up in August last year. It will have control over academic appointments and deal with the career aspects of university administration.

Three quarters of the council members will be elected from a multiple candidate list. The remainder will be co-opted.

Previous councils were hotly accused of being instruments for government and political favouritism under the previous regime but were limited to the university area alone.

The new council will cover both medical and dental fields - a notable departure from previous practice. It will also include tenured teachers from the elite *grandes écoles*, researchers and their assistants as well.

The inclusion of the *grandes écoles* is a new development. Hitherto this

elite sector of French higher education has remained untouched by the storm and strife - and the legislation that affected the universities.

In announcing this step M. Savary has raised the delicate and touchy issue of how far the *grandes écoles* are to be brought within the overall responsibilities of higher education. The French Socialist Party's election manifesto called for their incorporation, but the higher education framework bill which is still in draft stage, seems to be fudging the issue.

The third round in the long drawn-out battle between government and lecturers unions on revised conditions of service has just begun.

The dispute reached deadlock last November amidst mutual recrimination and it is becoming more acute as the unravelling of the higher education Guideline Bill approaches. The Bill will make radical changes to undergraduate studies and introduce considerable changes to higher education's remit.

One of the main stumbling blocks is the revised number of hours lecturers will be expected to teach

each week. At present this averages three hours a week for a 25-week year in addition to tutorial work.

M. Jean-Jacques Payen, director-general of higher education, has instead proposed four hours teaching per week over a 32-week year and six hours tutorial work spread over a 25-week year.

This work load is not unusual. It is current practice in the university institutes of technology - France's equivalent in the polytechnic.

Academics also have to face the question of their profession's future structure. At present it is divided into three parts: professors, *maitres assistants* and assistants. Current ministry proposals envisage two grades - professor and *maitre de conférence* (roughly equivalent to senior lecturers). Mid-grade lecturers (*maitres assistants*) will, if they wish, be on the senior lecturer grade.

Lecturers' unions are pressing for a single teaching body while the non-Communist Syndicat General de l'Education Nationale has called for equality between all university teachers.

Colleges count the cost of the microcomputer wave

from Sally Reed

WASHINGTON

The microcomputer's impact on college campuses throughout the United States over the last few years has led to dramatic changes in both administration and teaching.

The new technology has also created a host of new problems for colleges and universities over financing, teacher training, the development of software and philosophical issues about providing adequate access to all students and academic freedom.

Some 2,000 college presidents, deans and lecturers addressed these issues recently at a national conference on "Colleges enter the information society" sponsored by the American Association for Higher Education.

There is no longer any question that the technology has transformed higher education. Colleges now spend an estimated \$300m on computer courseware each year. Stanford University claims that 60 per cent of its lecturers now use a computer or word processor in their work. At the Rochester Institute of Technology all faculty and students - regardless of the field of study - are required to have some familiarity with the workings of a computer. At Carnegie-Mellon University, one of the leaders in computer use in education, all lecturers, administrators and 7,000 students will have their personal computers.

The problem for many educators is that while computers may be plentiful on some campuses, they are rarely used on others.

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Alfred Bork, professor of physics and computer science at the University of California at Irvine, said that in 20 years the computer would be the major source of information for students. "But the real problem is - where is all the course material going to come from?" he asked.

American universities did not have a tradition of developing courses and lecturers were unable to develop their own, he said.

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Its new - and female - general secretary firmly at the helm, the university lecturers' union will next week carry the campaign for women in the universities a stage further.

The Association of University Teachers is to hold its first representative conference for women members and Mrs Diana Warwick, who takes over fully from Mr Laurie Sapper on Tuesday, is to be one of the main speakers.

The main task for the Bath conference will be to elect a national committee to advise the union's executive on issues affecting women members. Six committee members will be elected annually from the conference - and two by the executive. So far 13 nominations for the six elected places have been received and attendance at the conference is expected to be up to 150 delegates and observers from all over Britain.

The committee will be the union's fourth national advisory committee - but the first whose activity is defined by gender rather than function.

The AUT's interest in the difficulties faced by its women members over job security, promotion prospects and pensions equality predates both Ms Warwick's appointment and the establishment some four years ago of the working party which spawned next week's conference and the elected committee.

But one of the discoveries made during a workshop last autumn was that existing policies on equal opportunities were not widely known. The framework exists, and the advisory committee will help the executive to flesh it out and campaign for its active application.

In 1979 in a charter seeking equality for women within the trade unions the TUC called on national executives to consider the desirability of setting up advisory committees to ensure the protection of women's special interests. The initiative was partly a response to the growing awareness of the second class status of women in the labour market - and partly an attempt to fuel a drive for greater participation by women in union decision-making. The TUC was acutely aware that many of the worst discriminatory practices were - and are - to be found among the ranks of affiliated unions.

While collar unions - such as the AUT and other teacher organizations with a high proportion of female members - were not to be counted among the offenders. But there was

Breaking down the barriers of academic machismo



Diana Warwick... the AUT's new general secretary will be a key speaker

a recognition that the education system was at the root of much institutionalized sexism and barrier building in society.

The Equal Opportunities Commission is known to be concerned at the underachievement of women and girls in the education system. At the instigation of the AUT, the EOC also tackled a study of the reasons women working in the universities also failed to do as well as might be expected from their abilities in the university service.

It found that women formed nearly 16 per cent of the full time staff. While 44 per cent of senior library staff and 26 per cent of administrative and research staff were female, only 10 per cent of academics were women.

Part-time staff with academic functions accounted for just 1 per cent of the total - but 41 per cent were women.

In salary terms, only 18 per cent of women were above the career grade of lecturer, compared with 40

per cent of men who were in senior posts. Only 3 per cent of professorial posts were held by women.

But, according to the AUT, the suggestion that the universities might be less than fair in their treatment of women is laughed out of court by the vice chancellors, who earnestly believe appointments are made solely on merit.

Prospects for women are worsening, confirmed Mr Alan Taylor-Russell, chairman of the equal opportunities working party. No only are women heavily over-represented among short contract staff who are most vulnerable to the cuts, but they tend towards areas least favoured both by ministers and the University Grants Committee.

A discussion document next week suggests a programme of positive action at institutional level to ease the problems. It says all selection panels should include at least one woman AUT representative - and specific consideration to her views should be

David Jobbins previews the AUT's first conference for women members

given before decisions are made.

Promotion patterns should be carefully monitored and child care, maternity and paternity leave and job sharing arrangements negotiated.

Motions for discussion range across issues such as provision of creches and the discriminatory nature of the universities pension scheme to the more controversial establishment of quotas for female staff and students.

The working party has firmly resisted suggestions that proposals for popular action discriminate in favour of women and against men.

"The term positive action can perhaps most usefully be seen as involving a systematic programme of steps in areas like women's employment, education and training which is designed to combat the effects of past and present inequalities and actively to promote women's equality without creating reverse discrimination against men," says the union's official bulletin.

Debate is likely to centre on whether this is enough - or whether at least a period of positive discrimination is needed to remedy the institutionalized injustices of the past.

At the September workshop it was generally agreed that existing promotion criteria worked against women by minimizing the importance of teaching. Irrespective of informal criteria, "academic machismo" worked against women.

There was a word of warning which will be ringing in the minds of delegates next week from Mr Keith Scribbins, assistant secretary of the National Association of Teachers in Further and Higher Education, and one of the key architects of the college lecturers' policies on women.

Women's rights policies should not

be seen in isolation but must be translated into unequivocal trade union claims with which to confront the employers, he said.

Natlie has a national women's rights standing panel to advise the executive - but its members, not all women, are elected from the union's 14 regions with a further five from the union executive.

A key debate at next month's National conference is the pace at which positive action and reserved places for women within the union's structure can be forced.

Resolutions calling for immediate action are likely to be met with an appeal from some supporters for a delay to ensure details are properly worked out - and to avoid the possibility of alienating members of the union opposed to further rule changes so close on the heels of the debate over affiliation to CND.

Next week's conference stems directly from a resolution passed by the September workshop and adopted by the national council last December. It set in train the mechanism for establishing the representative machinery - but its creation does not mean the end of the road for the equal opportunities working party.

It is to continue working to a brief laid down by the same council to examine the problems of race discrimination and access for disabled people to universities. The issue of sexual orientation also remains firmly on the equal opportunities working party agenda.

Enormous efforts have been made to eliminate trade union "macho" from next week's conference. Much of the hard work will be done in workshops away from the sometimes intimidating - even for university lecturers - formal debate on motion or amendment. And the chair is to be held by the three co-opted female members of the working party in rotation rather than by the president or vice president.

Universities' much-prized self-declaration as bastions against discrimination has, according to one member of the working party, led some academics into believing that it actually works. The new national committee is expected to spur the AUT into greater efforts into putting real meaning into the lofty words of so many university charters which blithely state discrimination should not and therefore does not exist.

Jon Turney and Felicity Jones report on two aspects of artificial intelligence

The computer as a teacher

It is not immediately obvious what a conference on "Artificial Intelligence and Education" will be about. Chalk-wielding robots? Space-invaders in peace studies? Or injections to boost dull students' exam scores? A glance at the conference programme was some help - I was to hear about some uses of computers in education. But understanding was still clouded by an abundance of acronyms - the computer buff's tribal insignia. Each speaker seemed to be an enthusiast for a particular programming language, with its own specialized syntax, or particular system, all with upper case names like POP11, PLATO, SCHOLAR or CODIL. And the two programming languages which seemed most popular were called LOGO and PROLOG. These, I gathered, were different, although of course you can implement LOGO in PROLOG - to give PROLOG.

However, any tourist benefits from a guidebook, and Edward Feigenbaum's magnificent three-volume *Handbook of Artificial Intelligence* helped me feel more at home in the AI environment (a favourite term - as in "programming environment", or "learning environment"). Put simply, artificial intelligence means making computers do things that people can do. That is, AI means programming computers to tackle problems whose solution is generally seen as a hallmark of human intelligence.

This definition indicates the level of AI researchers' ambitions, and the reason the field is often controversial. The problems studied can range from very simple ones (for people), like sorting wooden blocks into columns or sizes, to specialized intellectual tasks like chemical analysis using spectroscopy.

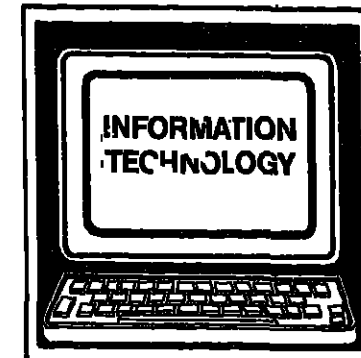
Work on this range of problems involves deep study of human perception and cognition, of modes of inference and ways of representing knowledge. Some AI projects seek to match or improve on human performance in, say, chess, without using the techniques of human players. (And the world backgammon champion, by the way, is a computer.) But the areas of the subject which focus on human learning and human reasoning as possible models for machine intelligence are more likely to produce systems with educational applications.

The conference, organized by the Society for Study of Artificial Intelligence and Simulation of Behaviour (AISB), was timely for two reasons. First, artificial intelligence research in British universities is expanding rapidly after years of neglect. The challenge of Japanese and American programmes to enhance computer power has dispelled the shadow cast by a report to the Science and Engineering Research Council from Sir James Lighthill in 1972 - which was sceptical about the future prospects for AI.

And just as quite a number of "new blood" appointments are helping work in university laboratories, some of the earlier fruits of that work are beginning to find their way into schools, if not yet college lecture theatres. So the AISB meeting, at Exeter University, was an opportunity to assess the state of the field and its likely impact on education in the future, even though it could only be a snapshot of a fast-developing discipline.

The central feature of my snapshot would be the so-called "expert system". This is the artificial intelligence's prize exhibit, and various forms of expert system were mentioned by speaker after speaker. They are usually seen as examples of "alienated, existentialist man" - rigorous analysis, related to contemporary politics and especially the investigations of the House Committee on Un-American Activities might alter the critical judgment.

In broad terms, whether the method should be quasi-scientific and narrow or contextual and wide, will of course remain a matter of debate, but there is little doubt that the new materials of popular culture will eventually require a re-appraisal of traditional critical methods.



Kowalski's work stems from his strong conviction that PROLOG, which is based on the problem-solving power of mathematical logic, is the prototype of the high-level languages which will be needed for the truly intelligent systems of the future. His position, in a research community largely wedded to the older language LISP (for LIST Processing), has suddenly become much more in vogue with the adoption of logic-based programming by the Japanese in their highly ambitious "fifth-generation" project.

This sharpens up the debate about the relative merits of PROLOG and its more fashionable LISP-derived competitor LOGO, developed by Seymour Papert at MIT. While many speakers argued that it was better to have several programming languages at one's fingertips, the first language learnt will be as vital a touchstone as the first natural language. And that first language will soon be learnt, in outline, long before the computer-literate pupils of the future leave school.

Whatever the outcome of this debate, Kowalski's description of his interactive PROLOG system was intriguing. For example, a programme to identify nationalities and citizenship (a complex legal question at present) solves problems by drawing on its own stored knowledge, and asking the user questions if it does not know enough to answer the original query.

The user becomes an extension of the system, "logically no different from a memory disc", according to Professor Kowalski. His aim was to make his property symmetrical, so that the user could also ask questions of the machine. In the end, input and output would become the same, depending on one's point of view. The system knew what it had been asked, and what it had been told, and responded accordingly.

So the result of a query to such a system - for example, one might ask a programme on social security law about entitlement to benefit - is a dialogue in which information passes both ways, with the answer emerging at the end. "This is the beginning of extracting from expert systems what they are about," said Kowalski.

This is still a far cry from a programme capable of helping a student through the kind of material in a university or polytechnic course, but it helps define the capabilities such a programme needs. Derek Sleeman, a British researcher working at Stanford, suggested that the area in which expert systems, or "nides", would benefit from efforts to develop intelligent tutoring systems was user modelling - the system should pick up the user's level of knowledge and tailor its responses to fit.

An intelligent tutoring system needs a "student model" programme into it - a model which can be modified by changes in the student's apparent competence and in turn modifies the tutor's output. Artificial intelligence abounds in hard problems, but this is very hard. Setting up a student model means having some idea about how students learn to solve problems. It is the output from an expert system isn't quite on target, the person whose knowledge is being incorporated in the computer will know - that's why this work can proceed. But a group of students can't tell you how to master a subject they haven't learnt yet, they probably can't tell you afterwards, either.

So the artificial intelligence has to work this out for themselves, and when you see how far they have got it's easy to understand why AI-based systems are still confined to simple uses in schools. At the moment most work focuses on student

After the official discouragement of research and study in artificial intelligence in this country following the Lighthill report in 1972, the stimulus being presented by the Japanese plans to develop fifth generation computers based on logic programming has begun to reawaken interest again across academic disciplines.

This renewed interdisciplinary interest was reflected recently in an Anglo-French colloquium on "The Mind and the Machine" held at Middlesex Polytechnic in cooperation with LIME University. The emphasis of the conference was on the philosophical questions thrown up by AI but the papers presented ran across a wide field from linguistics to psychology.

One of philosophy's age-old obsessions has been the relationship between mind and body. The "ghost in the machine" has been a dominant ever since Descartes used his *cogito ergo sum* argument to prove that he was not the victim of some evil demon who was tricking him into believing that the world and everything in it, including his own body, existed when in reality it did not.

Who am I? How do I know that I am not the only one here (everything else being a product of my own imagination)? Is there a soul? These have been questions central to philosophy linked with problems to do with personal identity, free will and determinism.

Now the search for a thinking machine and programmes which simulate human thought and the acquisition and use of knowledge has provoked these questions all over again. As computer scientists explore the rich seams of mechanistic, computer intelligence, the meaning of consciousness is thrown into relief.

This fertile field is making people reassess the relevance of concepts like "mind" and "body" and what exactly the difference between them is. In a paper, Aaron Sloman of Sussex University put forward the view that it was fruitless to argue about where the boundary should be drawn to preserve the essence of "being human".

In the same way that there is no essence of the game of chess, using Wittgenstein's example, only a family of rules which could imaginably be changed to make the game harder or provide some new strategies. So instead of trying to divide the world into things which have or have not consciousness, it is more profitable to examine the similarities between types of computer systems and human abilities.

Philosophers, he argued, can contribute to AI by analysing conceptual confusions and clarifying such ideas as to whether in fact a computer-like mode of mind does degrade human beings? And in turn, the computer scientist's models can provide a deeper understanding of the nature of the human mind.

Professor Margaret Boden, also at Sussex, was in no doubt that AI had given us a new standard of rigour and appreciation of the importance of mental process. "Linguistics already had rigour but no process; psychology has little of either and philosophy has less of each," she stated.

It seems that those in AI need to analyse the concepts with which they are dealing much more rigorously if they are not to fall into the traps from which philosophers have been trying to extricate themselves for centuries. Philosophically, the presuppositions with which they are playing are highly unstable and if AI is to be taken seriously then it too has to learn from the past and build on the traditional lessons learned in logic, philosophy, linguistics and psychology.

modify the third component, the "student model", which then makes predictions of student performance which are passed to a unit choosing the "teaching strategy". Finally, the chosen teaching strategy passes to a "teaching generator" which chooses the best item for the next exchange between the student and the teaching administrator, completing the cycle.

The modular design means that the parts which contain rules like those found in an expert system, the student model and the teaching strategy - can be kept relatively simple, and their outputs predicted fairly accurately.

This system can handle teaching tasks like imparting the secrets of a photocopy to a prospective repairman quite well. But this is not a teaching style anyone in a college or university would be very happy to adopt. As Jim Howe pointed out, good university-level teachers don't do much teaching in the sense of simple instruction. They act most as guides and advisors to students choosing their path through a great mass of material in their chosen discipline. And that looks like remaining a human preserve for the foreseeable future.

Think about IT...

"The inadequacy of theoretical approaches that fail to recognize the complexity of mental structure and process is now evident and psychology and the philosophy of mind have been influenced accordingly." Professor Boden is recognized as one of the major figures in AI in Britain.

It was a tragedy in her view, that the Government opposed its development early on, forcing many people to go to the United States in order to carry on with their AI work and leaving a gap in this country which it will be hard to bridge.

Sussex University had the first unit in cognitive studies with an interdisciplinary content where students can major, doing five months of their work, in philosophy, psychology or other subjects together with two months in artificial intelligence. And starting from the next academic year, students will be able to major in AI.

An example of the way philosophical analysis can bring some light to bear on the enthusiastic model-building of present day computer scientists was given by Yorick Wilks of Essex University. After he had stated in his paper that AI workers were "by and large, naive materialists and mechanists" whose job was to get on with simulations of ourselves, he counteracted the prevalent view that consciousness could be thought of in terms of interconnecting modules.

Most modern computer programmes, especially those in AI, are written in terms of modules which do not have access to other modules; as Carl Hewitt of MIT put it: "Modules shouldn't be able to dicker around with the modules of their neighbours". But in the same way that there is no essence of the game of chess, using Wittgenstein's example, only a family of rules which could imaginably be changed to make the game harder or provide some new strategies. So instead of trying to divide the world into things which have or have not consciousness, it is more profitable to examine the similarities between types of computer systems and human abilities.

He admits that there is nothing new in this idea since mystics have always talked in terms of levels, as have the nineteenth-century vitalists. But more important, what his paper highlights are the assumptions with which computer scientists are operating.

It seems that those in AI need to analyse the concepts with which they are dealing much more rigorously if they are not to fall into the traps from which philosophers have been trying to extricate themselves for centuries. Philosophically, the presuppositions with which they are playing are highly unstable and if AI is to be taken seriously then it too has to learn from the past and build on the traditional lessons learned in logic, philosophy, linguistics and psychology.

Today's cultural dross becomes tomorrow's gold

Dan Gillan on popular culture in the academic context

The appropriate role for popular culture in traditional disciplines is a topic which generates heated debate among academics. The recent conference of the British Association for American Studies in Edinburgh provided to be an ideal opportunity to canvass opinions and ideas on this topic from a variety of angles. Broad fields of inquiry, such as American studies, which require an interdisciplinary approach, are often highly suspect to academics reared in traditional blinkers to "find out more and more about less and less".

If the interdisciplinary approach itself is not sufficient provocation there is also the nature of the material examined during such inquiries - in particular popular culture. In the academic context this may be defined as any artform which a significant number of people choose to experience for recreation and pleasure rather than educational or moral purpose.

Any attempt to evaluate popular culture brings into question the traditional ethical divide between what is "worthy", and so implicitly right for study, and what is merely pleasurable, and so implicitly facile.

This often perverse disjunction, which usually also links pleasure with commercial success, ignores the cyclical progression of cultural history. In so much drama, literature, music and art increased familiarity, either engineered by intellectual special pleading, or self-generating in "pleasure" terms eventually converts the dross of popular culture into the gold of "high" culture. With equal inevitability much of yesterday's unpopular culture becomes today's staple; there is a move from both extremes towards consensus culture.

Meanwhile artists, writers and composers - prime movers - are continually revitalizing their fields of endeavour in search of an audience for the latest masterpiece. Creators for the most part create independently, while the critic and academic trail in their wake - in academic terms this usually means a "safe" period of about 10 to 20 years.

Thus a steady stream of anxiety is caused by the rolling academic "avant-garde". In his lecture "Bob Dylan: can this really be the end?" delivered at University College, Wales, Aberystwyth in March 1982, Professor Christopher Ricks claimed with a barrage of examples from Dylan's lyrics, that by any criteria, this singer/writer should be acknowledged as a major poet: approaching the quality of Shakespeare or Wordsworth, a claim greeted with polite interest but a certain reserve by many of his listeners.

At Exeter University reggae and blues are studied both for their intrinsic qualities and for the light they shed on wider cultural concerns.

Dr Mario Maffi at the Instituto di Angelica in Milan agrees with this approach, and is particularly interested in the middle ground between social history and literature round about the turn of this century. He said: "I feel the need to give a more complex idea of American society to my students, above all of urban culture, which is as much a visual culture as one you can study in books. To understand how the masses are viewed by observers and writers, the student must also see them and hear the sounds and songs of the period".

Friendship with Ewan MacColl and

Peggy Seeger has helped him to appreciate the importance of folk-song and popular entertainment in understanding social patterns and problems.

This approach can be rapidly dismissed as "anecdote not criticism" by purists. Dr Maffi absorbs the intended reproach. "Anecdotes can serve the literary or the cultural critic, they are not tidied up, not pre-emptive reaction of a person to something; in a sense it's another interdisciplinary approach. Of course if it comes to 'anecdote' only, that is not good, but let it serve as a help, if it can make literature or history more accessible."

The photograph can be the visual equivalent of anecdote, which removed from its purely aesthetic context and related to wider culture. Ralph Bogardus, an associate professor at the University of Alabama, came to study photography via literature - his dissertation was about the collaboration between Henry James and Alvin Langdon Coburn who created the photographs for James' definitive New York edition. "James directed Coburn in a 'series', rather like a film director directs a movie, to make a series of images that would work as his symbolic front-piece for each of his volumes".

Bogardus also looked at a whole range of other apparent influences from photography on James. "The possibility of photography influencing literature was not new - 'Naturalism' or literary realism in the nineteenth century was often accused of being photographic - of course this was a put-down. Critics said it was like a journalistic report, so therefore the content was 'it's not art, it's reportage' and would be dismissed."

His current concern is with a very different sort of photography, that of

Vic Howard in Harlan County, Kentucky. Bogardus terms this modest commercial photography an unknown "visual anthropology". The 30,000 negatives made between 1940 and 1970 reveal a community at some of its important moments - only some because, as a result of indirect pressure from the mining companies, he deliberately avoided coverage of the strikes and other violent confrontations which have made the district notorious. This less agreeable side was vividly portrayed in the award-winning film *Harlan County, USA*.

A great deal of research has gone into the history of photography, but comparatively little thought has been given to a conceptual scheme that will cope with the special qualities and characteristics of the still image as opposed to the moving image. At that "frozen moment" the interaction between photographer and subject needs to be defined; notions of reality and truth can be radically altered by the confrontation. Bogardus cites the example of Jacob Rika who used the photograph to expose social evils and who thought he was showing an objective reality, whereas careful analysis that he constructed his reality by selection and framing, to suit his purpose.

It is exactly this note of critical caution that is taken up by Olaf Hansen, who teaches at Frankfurt University. In discussing the work of the photographer, he stresses that there must be a rigorous framework of analysis if popular culture and other material from academic respectability - "We are under an obligation to do this theoretical work, otherwise we'll always be accused of just showing illustrations".

His current concern is with a very different sort of photography, that of

as it is very easy to misinterpret an image, but careful scrutiny can reveal a great deal - he points out the man with a Bauhaus pattern on his tie in one of Howard's celebratory photos of the bold geometric design apparently reached Harlan County via a Sears Roebuck catalogue, a somewhat unusual path of cultural diffusion.

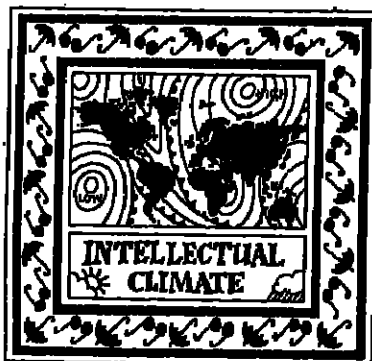
Film studies, while still subject to some quarters, have an advantage over studies of other cultural artifacts. As we saw in the case of the cause film has developed, particularly over the last eight or so years in this country, a specific methodology and critical approach which has given it a sort of academic respectability.

Richard Maltby, whose course at Exeter has been dismissed by some senior members of arts faculty as a "picture-book course", said that another advantage of film studies was "the absence of a canon of respected texts which have to be dealt with".

The implication of this is that a more direct approach can be made to material such as *Out of the Past*, released in November 1947, a low-status Hollywood product which has been made more important for us than it ever was at the time by its critical process. Its characters are other in similar films, usually seen as examples of "alienated, existentialist man" - rigorous analysis, related to contemporary politics and especially the investigations of the House Committee on Un-American Activities might alter the critical judgment.

In broad terms, whether the method should be quasi-scientific and narrow or contextual and wide, will of course remain a matter of debate, but there is little doubt that the new materials of popular culture will eventually require a re-appraisal of traditional critical methods.

Army stages a tactical withdrawal



Nick Caistor looks at the post-Falklands intellectual climate in Argentina

According to leading physicist Dr Jose Westerkamp Argentina's universities have for the past few years been experiencing "the peace of the cemetery". But the next few months are likely to be much livelier.

After seven years in power, and largely due to the Falklands disaster, it seems that the armed forces are finally admitting that their original aim of "reconstructing" Argentina has failed. They have promised elections for October, with the handover of power to the winners early in 1984.

They are hoping that this can be achieved without political turmoil and without too close an investigation into the way they have run the country since March 1976. Their withdrawal from power has come less because of a direct challenge from social and political opposition than as a result of their patent incapacity to resolve any of Argentina's pressing problems. This exhaustion of ideas and alternatives is clear from their approach to education.

In 1976, the area of education, and in particular the universities and teacher training institutes, was a prime target for the "cleansing" operation the armed forces deemed necessary to rid the country of ideological subversion. Their first priority was to eradicate any left-

wing Peronist supporters still on the staff from the early 1970s.

There was a massive witch-hunt of both staff and students, and in some cases, such as that of the economics department at Bahia Blanca, or the National Geophysics Research group, entire departments are dismantled. University autonomy was revoked, and all political debate was banned from the campuses. Even after the initial purges, plainclothes police were among the universities' most regular attenders, and both students and staff were kept under close watch.

The second stage was to reform the curricula, suppressing anything considered ideologically dangerous, while at the same time removing many courses from the universities altogether. There was also a concerted effort to keep down student enrolments. Whereas under the Peronist government any student successfully completing secondary school had the right to enter university, now entrance exams were introduced, and the numbers of students for the more popular courses were limited drastically.

The ministers of education appointed by the successive military presidents all stressed that the old Argentine dream whereby every working class immigrant's son would



Human rights demonstrators in Buenos Aires demand information on people who disappeared in the 1970s. The boot on the cross symbolizes oppression

become a doctor, engineer, or lawyer (and his daughter a psychologist) were over - the armed forces were not interested in social mobility, preferring a stable society in which the rich enjoyed educational privilege and the poor were to be content with their station in life.

To reinforce this privilege, the third strand of the military's education strategy was the active promotion of privately funded universities and colleges. The only success story over the past seven years in education has been the Universidad del Belgrano, and it is no coincidence that this confident, expanding private university is situated in one of Buenos Aires' most exclusive neighbourhoods.

In addition to this, the burden of financing public education was as far as possible transferred from the central government back to the provincial authorities, thus exacerbating the already great difference between the opportunities available in the rich coastal area around Buenos Aires and the poorer regions of the interior, particularly in the north and west of the country.

Higher education suffered most of all though from the armed forces'

lack of any coherent initiatives to bring progress to Argentine society. With inflation over 100 per cent year after year - the official figure for 1982 was 210 per cent - the different education ministers gradually became content if they could just manage to pay the wages. The present minister, Cayetano Licciardo, admitted recently that up to 85 per cent of this year's education budget will be spent on this.

The defeat in the Falklands appeared to stun the armed forces in Argentina more than anybody else. It forced them to the decision to let the politicians find solutions to the country's economic and social problems while they themselves went about the task of re-equipping and re-thinking their role.

The promise of elections has created an atmosphere combining often euphoric relief and the anxious awareness that it is now - and in education as much as anywhere else - that the true "reconstruction" of the country must take place. And during the period of interregnum, everybody is trying to avoid doing anything which might fall foul of whoever eventually does come to power. As Dr Licciardo put it recently: "I'm not here to inno-

vate - just to hand over in good order to a civilian government".

This means in practice that strenuous efforts are being made to carry out what is euphemistically termed the 'normalization' of higher education. The different establishments have been asked to submit new statutes for government approval, after which they have been promised that they will regain their autonomy, and will be allowed to choose their own permanent staff.

This issue of staff selection is the one likely to generate most heat in the coming months, since everyone is aware that appointments made now are probably going to be questioned by the incoming civilian authorities. This will be especially true if, as seems quite possible, the Peronists yet again triumph in the elections, since they were the party thrown out by the armed forces in 1976 and have many scores to settle.

In the run up to the elections, the parties are more concerned with the grander matters of global economic strategy, what to do with the armed forces, and the general question of human rights to promise anything specific for education.

Disposable dons down under

Academic gypsies, they're sometimes called in Australia, but they're actually disposable dons. They cart their wives and kids from one position to another every three or four years," says one observer. "I employ someone in my own department who has had four jobs in six years in three different states."

Some, however, step off the academic ladder when they find it has only one rung. They take their bright minds and creative imaginations into business and industry or the public service, where people usually keep their jobs if they prove they can do them.

Altogether, about one in five of Australia's 11,000 or so university academics lack the security of employment most Australians take for granted. A slightly smaller proportion work in the colleges of advanced education. They are part of a growing group in higher education: people who hold their posts for limited periods of one to five years. The jobs themselves are short-term contract appointments, fixed term positions.

The tendency for universities and colleges to create more and more of these posts is a threat to academic freedom and the fulfilment of an academic's potential - according to university and college staff associations. Yet an Australian senate inquiry into academic tenure last year recommended that the proportion of non-tenured staff in higher education be increased to at least 10 per cent of those in the class of lecturer and above.

Moreover, a confidential paper prepared by the Tertiary Education Commission goes even further. It recommends that institutions should aim to achieve, within a decade, a proportion of limited term appointments among staff at lecturer grade and above that is twice the 10 per cent recommended by the senate committee.

For five years, a little publicized but vigorous and at times acrimonious debate has been going on between university staff associations and administrators about the increasing number of contract staff appointments. Now the Federation of University Staff Associations has launched a campaign against the appointment of untenured academic staff and is also lobbying politicians on the issue.

To understand the fierceness of the argument, one needs to look at how Australian universities are structured. At the top are the professors, now numbering about 1,100 in Australia. Below them are the associate professors or readers, then come the senior lecturers, lecturers, senior tutors and tutors.

Professors and readers, almost without ex-

ception in Australian universities, occupy tenured positions. This means their jobs are virtually guaranteed until retirement, no matter what the quality of the incumbent.

At the bottom of this academic totem pole are the tutors who have no job security, often on rolling, one-year contracts - and who may not be told until late in the year if they are to have a job the next. Temporary tutors are sometimes employed in March and sacked in November. As with fixed term lecturers, few universities offer tutors superannuation, long-service leave, housing assistance, access to conference leave or outside studies programmes.

"Vice chancellors sometimes speak of tutors as academic apprentices," but the federation says this is nonsense. Whoever heard of a 35-year-old apprentice, married with two children and five years post-doctoral experience? "It's not an apprenticeship for an academic career, but rather one for unemployment," says Jacqueline Smith, a senior tutor at Macquarie University.

In the middle of the university chain of command are various grades of senior lecturer and lecturers. Today, on average, more than 20 per cent of lecturers hold non-tenured positions, compared with just 12 per cent nine years ago. At the lecturer level, the fixed-term contract is now no longer an unusual alternative to probationary employment leading to tenure.

According to the federation, fixed-term lecturers are being used increasingly in several universities as a matter of policy - to enable institutions to shed staff relatively easily in response to financial restrictions, and to avoid the long-term commitments associated with tenure.

The reasons this has occurred have to do with what has happened to universities and colleges over the past 20 years. Throughout the 1960s and well into the 1970s higher education boomed. But by 1979, the institutions were in a steady-state situation and now, disturbingly, find themselves facing a decline. One of the key difficulties is that because little

new blood is coming in, the salaries of those who do have tenured jobs cost the universities more each year.

This is known as "incremental creep" and has been described by Professor Peter Karmel - former chairman of the Tertiary Education Commission - as "a hardening of the academic arteries". It is a problem likely to remain for a long time, for more than half of all full-time academics in universities are under 40 and four out of five are under 50. To work the older academics out of the system could take up to 15 years.

The Tertiary Education Commission estimates that incremental creep increases take up an extra 5 per cent of the universities' budgets. But this was happening at a time when the previous Fraser government continued to hold expenditure on higher education at a static level and when staff salaries were costing universities and colleges more than 80 per cent of their income.

To save money, most universities stopped filling tutor jobs and, in some cases, those of senior academics as well, as they became vacant and they are also appointing staff increasingly to temporary or limited term positions.

The argument used to defend short-term posts is that they provide the universities with flexibility needed in a time of rapid change. According to Professor David Carr, chairman of the Australian Vice Chancellors' Committee, and vice chancellor of Melbourne University, short-term appointments mean a greater turnover of staff, making room for bright young graduates coming up behind. "We tend to listen to the arguments from people who already have jobs in universities, rather than from those outside looking in for work," he says.

But the secretary of the Federation of University Staff Associations, Mr Les Wallis, claims: "It is not so much flexibility, as cost-cutting that have led to the growth of fixed-term appointments. If, as in many universities, fixed-term appointments are not granted

superannuation, there is a 10 per cent saving for a start, Mr Wallis says.

No fixed-term employee stays around long enough to qualify for long-service leave, so this adds another 2 or 2½ per cent saving. And if a fixed term appointee is retrenched after three years to be replaced by someone else, the cost of incremental creep is minimized and the question of promotion never arises.

The federation says short-term appointments limit academic freedom. Without tenure, academics are less likely to speak out publicly, they may not speak out even within their own university or within their own discipline if they are in a minority.

The more serious argument against fixed-term positions, however, is that they prevent academics from initiating and following through long-term programmes. Academics say this leads to "Mickey Mouse" research projects - meaning short, simple ones. And, say the critics, the fixed term teacher may not be employed long enough to develop his own course and an academic on a three-year appointment can hardly supervise a postgraduate student who may take five years to complete a higher degree.

Nearly everyone - from the senate committee, the Tertiary Commission and the vice chancellors to the academic staff associations - seems to agree that there are other options to relying solely on limited tenure for preventing hardening of the academic arteries. These include early retirement schemes, part-time permanent employment of senior staff, exchanges between government departments, industry and universities, and secondment of university staff to outside organizations.

But such proposals have been handed around in higher education circles for five years, with the only real change being an increase in academics on short-term contracts. Says the staff federation: "The educational and research purposes of universities are ill-served by the policy of employing large numbers of fixed-term staff. The general pattern of employment of professionals in both the private and public sectors in Australia is based on an assumption of continuing employment. The university system of employing highly-qualified staff for a limited period, only to sack them and replace them with others, is most unusual within our society and quite contrary to the norms applied in other areas of the workforce."

Geoff Maslen

Thomas A. Markus examines some issues behind the teaching of building design

Higher education in architecture is under stress. The University Grants Committee letter of July 1981 identified a possible mismatch between student numbers and graduate opportunity. One casualty was the Bristol University school which went down, after a brief struggle, apparently friendless within the university. Other schools have experienced this institutional isolation, a consequence of the way the discipline claims to straddle academic divisions - themselves a reflection of Cartesian fragmentation into disciplines; not surprisingly this claim is met with puzzlement if not resentment.

Beyond the obvious desires of government to economize on the number of students and schools and on the funding of one of the longest higher education courses (five years), followed by professional training which is non-funded, and the profession's desire to avoid over-manning, there are significant but less evident issues. To understand them a closer look is needed not only at the profession, but also at the object of its activity - architecture.

The most important attribute of architecture is that it carries meaning in at least three different ways. In the language made fashionable by French scholars, there are three discourses of architecture. Discourse is a useful word encompassing all evidence in a field of ideas - everything said, written or done ("doing" in architecture is designing and building). It also includes silence - those things which could be said, written or done, but are not.

The first discourse in architecture is that of form - image, style, symbol or composition. This is the traditional home territory of architectural historians, theoreticians and critics and its methods are those of stylistic analysis and compositional geometry whether these are applied to the language of the classical orders or to that of post-modernism.

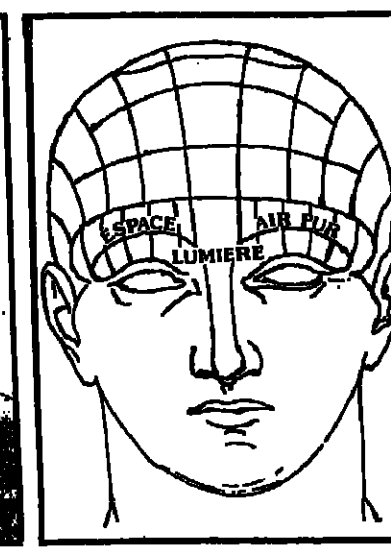
The second is that of function, which deals with the use and purpose of buildings. This is the spoken or written language in which the purpose is defined, sometimes by a similes letter from prince or pope, sometimes by an Act of Parliament (such as that defining the purpose of Edinburgh Bridewell jail, in 1791, which was eventually built to Robert Adam's design based on principles derived from Jeremy Bentham's Panopticon) and today by means of a multi-volume brief for, say, a new hospital. Such documents use functional labels, they create silence by possible words not used, establish relationships between different parts of the statement and divide the brief into sets and subsets; all these form a conceptual structure, with meaning which is well beyond the common sense, apparently indisputable sense of the words and statements. The words "parlour", "museum" or "hospital", and the classes of objects defined for the museum or of clinical specialities for the hospital, embody specific intentions about how a function is to be fulfilled.

The third discourse, then, is that of space - considered as a pattern of interconnected elements. Almost 200 years ago Durand began to speak of space in this abstract way, in teaching compressed rules of composition to his students, the architects for the new empire, at the Ecole Polytechnique. Apart from Christopher Alexander's *Pattern Language* (1968) little was achieved until Bill Hillier and his colleagues at University College, London, started exploring spatiality at an explanatory level. Today their techniques are the most rigorous available.

Although experts' language in the three discourses is specialized and esoteric, the phenomena described are matters of daily experience, a stream of images, functions and spatial sequences. Moreover the three sets of phenomena are independent of each other, yet are accustomed to a variety of styles and forms for museums, hospitals, a spatially "deep" building may be a bank or a hotel and both can have any form; a post-modern building may have any function or spatial structure. Further, the three attributes are not static. Not only forms are altered over time, but our perceptions of them shift with changes in conscious-



A print by Shepherd of the East End of Robert Adam's 1791 Bridewell Prison in Edinburgh, based on the principles of Bentham's Panopticon and a phenomenological drawing by Jean-Baptiste Andre Godin (1871) showing zones of space, light and fresh air in the brain, upon which he designed his industrial community at Guise, Northern France



Architecture under stress

ness due to habit, associations or education. Functions are changed in minor ways as well as major, when, for instance, we place a skating rink in a disused church. Spatial structures change as greater enclosure or more permeability is created: the disappearance of small alleys and streets to create megablocks in cities, the building of tunnels and bridges, the creation of dead-end streets or corridors which were previously through routes, are common examples.

Each of the three discourses yields meanings. To discover the global meaning of a building that of each separate attribute has first to be found - but in a common discourse.

The only one which seems capable of dealing with such disparate phenomena is that of social relationships. These are not only those of everyday experience, analysed by social scientists, of self (or others) to others, but also those of self to self, which answer the questions "Who am I?", "Where am I going?" and "What am I becoming?", and those of self to other which are concerned with cosmic order, whether made evident by God or gods, reason, science, society or merely the wind in the willows. The discovery of the meaning of the three discourses in social relationships, at each of these three levels, can then be mapped back into the work of architecture, where they will combine in many ways. Sometimes there is a plurality of meanings; sometimes most curious but revealing conflicts, such as ecclesiastical Gothic facades for stock exchanges. Architecture, so understood, is part of the social process, and one of the mechanisms by which social relationships are structured. These structures, when they frustrate relationships from self, others or (as Marx called the other) nature, result in the opposite of relationship, three types of alienation.

Clearly there is a contingent, inevitable relationship of these three attributes due to the materiality of the object and its production: it is impossible to produce a building, for a function, which has no spatial structure, or is without a form. But to attempt to relate the attributes to each other directly, by binding them together and calling this circumscribed field "architecture", without reference to society as a source for meanings, is to accept a materialism of the crudest kind.

The early modern "form follows function" dictum expressed precisely such an attempt, rejected when the heady hopes of architects' participation in the definition of functions for the new architecture were dashed and the acceptance of functions determined by others as being form-determining was recognized as abandoning the last remaining architectural freedom.

The enlightenment, the French revolution and the industrial revolution created a powerful new synthesis of the three discourses in a search for

greater order in towns and buildings. The proliferation of new building types serving the new society made possible the concrete achievement of ideas which apart from a few military, colonial or princely projects had previously been Utopian dreams. Institutions such as hospitals, prisons, asylums and workhouses, to create cities purified of physical, mental, moral and productive disorders, became realizable; so did industrial settlements such as Robert Owen's New Lanark and Titus Salt's Saltaire as well as vast housing projects committed to the integration of form, function and space in a search for discipline and order. Thus began that drive which came to fruition in the zoned and classified nineteenth-century city, the sanitary legislation, local authority housing and the garden city. The story has recently been explored in the context of Scottish enlightenment (*Order in Space and Society: Architectural Form and its Context in the Scottish Enlightenment*, Mainstream, Edinburgh), where much of Europe's intellectual and technological energy was concentrated for a time. The effects of this are still with us. Following Garnier and Corbusier's visionary cities degraded versions were built in the form of tower office and housing blocks, urban motorways and comprehensive development areas in every major city in the world. The totalitarian regimes of the 1930s used the ideas for their own purposes even to the ultimate purification project in Auschwitz with its "Arbeit macht Frei" triumphal entrance arch.

Once the Utopian ordering projects were absorbed into concrete practice on such a scale, and the three architectural discourses were developed to achieve new ends, parallel advances in the means had to be made. These were in technology - of two types - production and design. The inventions in cast and wrought iron, steel, concrete, glass, prefabrication, services and lifts were quickly appropriated by architects, from industry, and military and naval establishments. The pursuit of hygiene involved, after Chadwick's 1842 report, social engineering of fresh air, light and space, became the key motifs. Fourier's phenomenological disciples actually located these words in the brain; and the CIAM Athens charter of 1933 (uncannily) repeated them almost verbatim as the basis of modern architecture.

The shift in ends and means required a working agreement between designers and clients - the state, city institution or private developer. This agreement accepted the character of a pact which ran something like this: "We (the clients), the owners of the resources of land, labour and materials necessary for the implementation of any major planning or building project, intend our building activities to reproduce and reinforce the last remaining architectural freedom.

The enlightenment, the French revolution and the industrial revolution created a powerful new synthesis of the three discourses in a search for

freedom to conduct the formal discourse (with some notable exceptions, as when we require the Houses of Parliament to be Gothic or Tudor). Your academies, schools, journals, books, history, exhibitions, criticism and debate will concentrate on this discourse. We will assist you by locating the definition of your activity in the field of fine arts (*beaux arts*) so that criticism of your products will be couched in language making them indistinguishable from large pieces of public sculpture. In this debate all your intellectual and critical energies are to be absorbed - if you wish you can, metaphorically at least, kill each other.

"Further, the discourse of function will remain in our (the clients') hands. It will be explicit and structured as a 'technical', 'factual' or 'neutral' issue, for which purpose a panoply of building regulations, codes, official documents and 'objective design methods' will be created to enable you to act as our agents. The discourse of space will be implicit - we will set no spatial objectives and you will exercise no spatial critique but act as unconscious agents. Spatial structures will be the result of an osmotic process of precedent and convention, so that the existing and dominant spatial patterns will be reproduced. We will also make available such production and design technology as is required - and value its use in the name of 'objective' rules. In return we (the clients) will give you legal guarantees of title, status, income and entry qualifications."

In fact the Architects' Registration Acts, from 1931 onwards, were a serious attempt to weaken some aspects of this pact, particularly relating to education, entry and title, by transferring powers to ARCUK, but have been elegantly circumvented by the RIBA.

After the Second World War the reconstruction programme of the welfare state was seen as requiring enhanced status for architects. The RIBA sought to achieve this through a reform of the educational system, launched by the 1958 Oxford conference. In place of the then existing mixed system - apprenticeship with part-time study and full-time courses, usually modelled on the *beaux arts* system, in a variety of art schools; technical institutions and some universities, the five-year full-time university course was to become the norm. A level entry, the incorporation of more science ("building science", understood as having to do not with building but with environmental studies, and social sciences), design methodology, multi-disciplinary team working and industrialized building technology became *leitmotifs*. The still lively practical skills were relegated to a new hand-maiden profession of architectural technicians, who henceforth would know more about drains and wiring than architects. In turn the separation from building production was

made even more complete. The art and drawing content of courses diminished. But overall the changes were far from being merely an extension of the pact: they released forces which have become formidable challenges to it.

What are a few of the differences between the old and the new systems? There was perhaps a diminution of practical skill, accompanied by more skill in environmental and energy matters. Perhaps a loss of artistic endeavour, and drawing ability, in favour of an increased social consciousness which has led the schools to pioneer the so-called community architecture movement. Some of the theory and history work has attempted to break out of the pact by encompassing the functional and spatial critiques. But most has continued to underwrite it with its art-historical tradition, much strengthened by an influx of Germanic descriptive scholarship during the last war.

Andrew Saint, in a recent book (*The Images of the Architect*, Yale University Press) pleads for "a smaller architectural profession, in which imagination and artistic ability are more evenly balanced with technical and managerial experience... and in which 'sound building' is valued above 'high art'." In a recent review of that book (*New Statesman*, March 25) Stephen Mullins fully supports this view, and, in turn, advocates a transfer of control over architectural education to ARCUK, a reduction in student numbers, and a change from the "vague liberal arts" mish-mash to proper vocational training taught by good practitioners. These good practitioners, according to this critique are likely to be ones who became good in spite of both the pre and the post-1958 systems, not because of them. The replacement of art by good building, while it undermines a cornerstone of the pact, replaces it with a technical issue, rather than bringing the other discourses into the open.

With two, perhaps more, critical factions even within the profession, the odds against the schools seem heavy, although the simple schools-versus-practice model cannot explain the politics of the situation. New alliances, between types of practice and types of school, are being, and will be, formed. If the outcome is a shrunken but accessible system, with a narrower and more traditional view, this may simply reflect the tragic truth that architecture, because of its resource requirements, and quite unlike any art form, is by definition the handmaid of a power structure, whatever its political colour. While the arts are free always to present radical challenges to power, paradoxically it is by maintenance of the fiction that architecture is another form of art that it has become emasculated and subservient. That is not to say that a new architecture would lack creative imagery.

The designers would have to exercise in the formal discourse, artistic freedom to an even greater degree than in the past. Their work, superficially at least, may even look like much of the work produced under the pact. It will certainly want to learn from the very best formal techniques, of Foster and others; use the most advanced but appropriate technology; the most powerful computing methods. But all these will be reshaped by new intentions, new responsibilities and matching new skills. Ultimately architecture's ability to subvert and transcend power structures depends on whether its practitioners receive any prophetic insights in their education. These insights would have to share some qualities with those of Blake or Piranesi, in his *Carceri* etchings, seemed to present, that dark, paradoxical underworld (in spite of the name) as the architectural space in which the human spirit could grow and be free. This architecture and this spirit subverts the super order of the classical architecture in the bright light above ground and the society of Satanic mills which owned both it and its architects, just as his weeds overgrew, split and win the remnant of the Roman order.

The author is professor of building science at the University of Strathclyde.

John Irvine's and Ben Martin's recent study of the Isaac Newton Telescope (INT) at the Royal Greenwich Observatory (RGO) caused a considerable stir (*THE* February 18 and February 25). In it they have applied a set of statistical techniques and sought to assess whether a particular scientific institution has been operated successfully. But their contention is that methods such as theirs have a wider application. They believe that such studies could become essential in any planning of future installations in "big science".

The basis for this claim is that there is now only a limited number of independent groups operating in any one field of big science and that it is therefore becoming progressively more difficult to obtain unbiased opinions on the merits of any one operation or proposal. Perhaps there is an element of overstatement: there are always scientists who work on theory rather than experiment, or observation, and these theoreticians tend to be quite independent of the big laboratories and observatories.

Be that as it may, would it in fact be wise, or even possible, to make direct use of a study such as that by Irvine and Martin in laying plans for a great project, or in running an institution? Some quite general principles are addressed by this question, but it is best to be fairly specific.

The three major questions that arise quite naturally are:

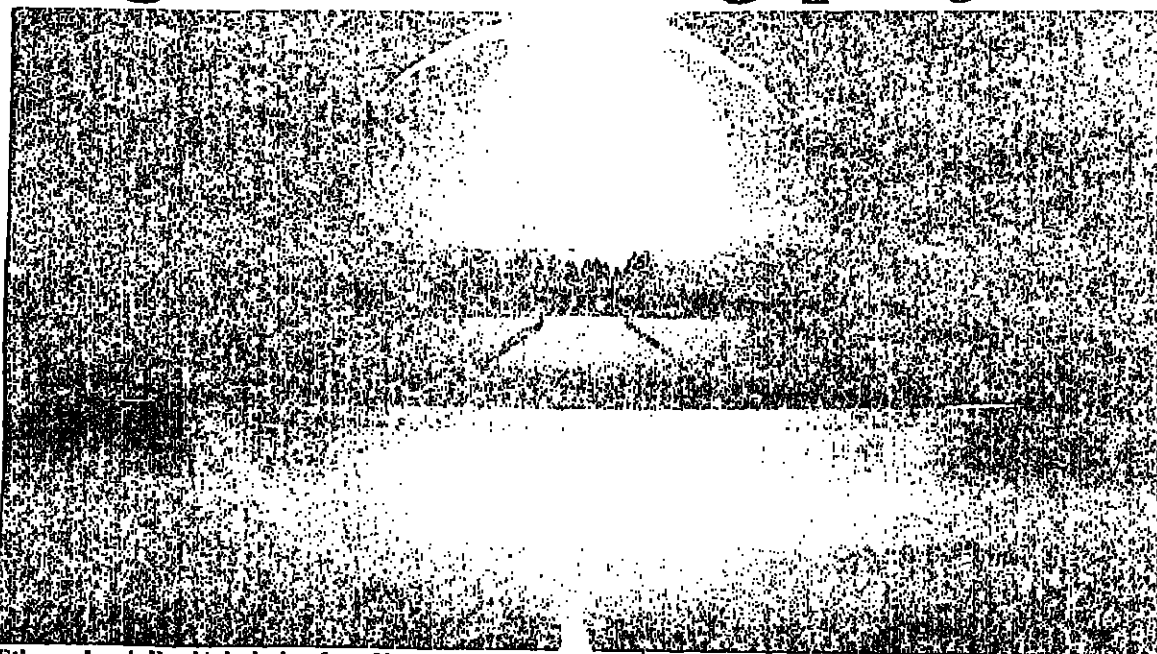
(i) As time passes there will be changes in the technical and political circumstances behind any project. How quickly should the managers of the project alter their plans in response?

(ii) A project may have been completed and have turned out less than perfect. What effect does this have on the way that the new apparatus is used?

(iii) Peer review is commonly used as one method of establishing a league table for the quality of different institutions, at some particular time. The positions in the league table are not fixed. How long are the results of such a survey valid?

The history of the INT serves quite well to illustrate the nature of questions (i) and (ii). The proposal to construct a large telescope for Britain goes back to 1946, a time when patriotic feelings were high but money was tight. There was a great deal of latent talent for astronomy which could not be exploited because of lack of access to telescopes.

Big ideas for big projects



Etienne Louis Boullée's design for a Newton memorial. Would he have preferred the Hersmonceux telescope?

F. D. Kahn comments on John Irvine and Ben Martin's controversial study of projects in astronomy

British weather was no different in 1946: all concerned realized that there are parts of the world with much clearer skies. Now it is routine for an observer to overcome this problem by flying, say, to Australia, for his allocation of time on the Anglo-Australian telescope, and to be back at his post within three weeks. No jet planes were in service in 1946, and it would have seemed inconceivable that a telescope abroad should be built for use by observers based in Britain.

But by the time control of the INT had passed to the Science Research Council, and it was opened in 1967, such a mode of operation would have been accepted as quite feasible. At some time between the conception of the idea and the completion of the telescope there must have been a change in the nature of the best solution to the problem. At what stage should the managers have responded? Clearly plans cannot be altered too frequently, or nothing gets done.

It is not only the improvement in transport that leads to changes in plans. It is equally important to respond to development in computer and control systems, in techniques of light detection (photographic plates versus solid state devices) and most important in the nature of the scientific research that are to be carried out. The questions that are raised here are quite general: all these remarks can be formulated so as to apply to other branches of science.

Given then that an instrument has been built and is found to have handicaps, what is the best course to adopt in using it, and what are the likely consequences? There were obvious drawbacks attached to the INT when it was sited at Herstmonceux in Sussex. The average number of nights with clear skies was much lower than at good sites overseas; further, since Herstmonceux is close to sea level, the atmosphere introduces far more disturbance, even when the sky is clear, than at a site

at high altitude. The result is a noticeable degradation in the optical images that can be obtained.

Faced with such limitations the directorate of an observatory has to recognize that there are whole classes of astronomical investigation which cannot be carried out competitively with the instrument. It is therefore forced to give emphasis to those branches of the subject where the effect is less drastic. But having thus restricted the operation it cannot then optimize the use of the telescope for timeliness and relevance of research with the same freedom that is available to other observatories at more favoured sites.

It is therefore not at all surprising that the observations which do get carried out are not world-shaking. This accords with the conclusion that Irvine and Martin draw from the statistics that they gathered from reading the Citation Index. The over-headers for a telescope, on the other hand, are not much affected by the

local climate. A telescope under a sky that is frequently cloudy will lead to a higher price, per paper published.

These, then, are the inevitable consequences of operating an instrument in an unsuitable climate. Another response is possible: take the telescope elsewhere. The decision to do so was taken some ten years ago. The instrument has now been installed on the island of La Palma in the Canaries.

Finally the value of peer assessment. Irvine and Martin quote results which produce a nearly definite pecking order. One has to agree that peer evaluation is a good way of establishing a league table, and naturally Irvine and Martin have used it in connection with other branches of science as well.

But the results have to be applied with care. The position of an institution in such an order of merit can be very strongly affected by events such as changes in staff and, even more, by the commissioning of new instruments. It would be interesting to discover whether Irvine and Martin obtain the same result if they repeat one of their surveys after an interval of five years, say.

On the other hand the well-informed insider will be able to spot trends far sooner than the impartial outsider. So one has to conclude that peer assessment has a value and that due weight must be given to the opinions held by people who actually understand the subject being examined.

What attitude should a scientist take to studies of this kind? Should he be up in arms in the face of the implied criticism, or should he be grateful to be offered some help in making decisions for the future? Neither reaction seems quite appropriate. The allocation of funds for scientific purposes, and the consequences of such actions, are a legitimate field of study for members of a Science Policy Research Unit.

If they can draw valid inferences from a particular set of experiences, so much the better. But there are deeper truths underlying the simple statistical analysis. As they stand, the results they have reached are interesting, but they could become considerably more so with a more thorough interpretation.

The author is professor of astronomy at the University of Manchester.

Gandhi as the prophet of Indian social education

When the Calcutta University Commission had completed its investigations in 1919, its chairman, Michael Sadler, before the official report was published, gave a private address to the senate of Bombay University. He spoke on *The Educational Movement in India and Britain*, identifying three principal areas which called for urgent attention - primary education; improvements in higher secondary education; teachers, their preparation and control.

He expressed strong doubts as to whether a European model would fit Indian conditions and he concluded: "If you want social dynamism, modern elementary education of the customary kind will give it to you. It is the agency which will put the masses in motion. But to what issue no one can foretell."

If fell to Mohandas K. Gandhi to be the prophet who foresaw where the problem of vast illiteracy had to be tackled. He realized that it was by an awakening and reorientation of the adult mind that society could be organized in new directions. It was, accordingly, wholly appropriate that the term social education was substituted by the government of India for adult education. The term is more comprehensive than what has generally been understood in England by adult education. It implies what the Gandhi-inspired report of the Basic National Education Committee speaks of as "the literacy of the whole personality".

Foreseen in Gandhi's idealism is an India that as an enlightened democracy will play its part in the arena of world politics, both as a peacemaker and as a champion of the cause of oppressed peoples. To achieve these aims it would be necessary for the teeming millions to be turned into a sufficiently educated

In the wake of the excitement and the furore caused by Attenborough's *Gandhi*, J. H. Higginson looks at Gandhi's impact in the field of learning

electorate, so that they could take part in solving the problems facing India, not least when independence would be achieved.

In 1915 when Gandhi returned from South Africa he had behind him the vitalizing experience of his crusade against the doctrine of racial superiority. He found an India of apathy and downtrodden masses in which even the leaders of the various parties looked more to the imperial rulers for deliverance than to the people. He began the uphill struggle to create a consciousness of unity among the Indian people.

The task which confronted him has been likened to a conflict between the broad vision of a prophet and the sectional activities of a politician. Gandhi combined both attributes in his writings, preachings and personal example. He brought the kindling torch of knowledge to the remotest areas, awakening his countrymen from their frustration to an awareness of rights and responsibilities. From the teaching of his Ashrams in India to the large masses of villages he gave the inspiration of a new social order.

The Quit India Movement launched by the Indian National Congress in August 1942, under the leadership of Gandhi, stirred the entire nation. Gandhi came out of gaol with a new conception of the basic education scheme known as Nai Talim. One of his first pronouncements after his release was: "I have

been thinking hard during the detention period over the possibilities of Nai Talim... We must not rest content with our present achievements. We must participate in the homes of the children. We must educate their parents."

Through his talks and writings he tried to explain this concept of Nai Talim as education for life through life because: "It has become clear to me that the scope of basic education has to be extended. It should include the education of everybody at every stage of life."

Not long before his death Gandhi described in detail how his concept of Nai Talim had grown in depth from the time when basic education put such an emphasis on education through crafts. He said that: "This true education must be easily available to everyone. It is not meant for a few lakhs of city people but must be within easy reach of millions of villagers. This education cannot be given through the dry leaves of books. It can only be given through the book of life. It can have nothing to do with the teaching of sectarian dogmas or ritual. It teaches the universal truths common to all religions."

Gandhi's historic march to Dandi was one of the most significant experiments in mass education. It awakened the whole country to a sense of duty. He directed the students to devote their vacations to village service. He expected them to stay in the villages and conduct classes for adults. They were to teach the rules of sanitation.

In Gandhi's view the dynamic for change was the peasantry, the tillers of the soil who produce the food. Hence he concentrated on bringing about the material and intellectual improvement of the rural population.



He considered that industrial cities had grown to meaningless dimensions in the apparatus of money and machines. Through a widespread education of adults he sought to pass on his vision of a non-violent socio-economic order as a legacy from generation to generation.

As the conflicting assessments stimulated by the Attenborough film show, Gandhi's was a complex character. When Lord Mountbatten addressed the Royal Empire Society in London on October 6, 1948 he said that Gandhi in India: "was not compared with some great statesmen like Roosevelt or Churchill. They classified him simply in their minds with Mohammed and with Christ."

Earlier, in India itself, speaking at the All-India Education Conference in December 1947, a distinguished Indian, K. G. Saiyidain had told his audience that Gandhi was the

The author was formerly warden of Sadler Hall in the University of Leeds.

N. W. Tanner and J. S. G. refute accusations that Oxford admissions reflect social bias

Is there a touch of class bias?

There is an ancient and honourable tradition of condemning Oxford for being socially elitist. Most recently it has been Philip Whitehead's Labour Party committee on post-18 education complaining about the unreasonable proportion of undergraduates from private schools and threatening Oxford with quotas imposed by legislation. Before that it was Neil Kinnock, MP, describing Oxford as a "major cancer in the educational system". But we can go back to the sixteenth century and find in a sermon of Bishop Hugh Latimer the words:

"He [the Devil] get him to the universities, and causeth great men and esquires to send their sons thither, and put out poor scholars that should be divines."

Mr Whitehead and Mr Kinnock might like to remember that Bishop Latimer was eventually burnt in Oxford, although possibly for theological and political rather than educational heresies. In fact there is not much defence for the past: the Public Orator of Oxford for 1768 recorded the reasons for the expulsion of several undergraduates, among them "James Matthews - accused that he was brought up to the trade of a weaver - that he kept a taphouse - confessed". Oxford is certainly more tolerant today but there are still precursors of weavers among the undergraduates of Oxford, or at least so it is believed. Curiously Oxford is the only university in the country which makes its decisions on admissions without any knowledge of parental occupation.

The substantial accusation is that the proportion of Oxford undergraduates from independent schools is at 52 per cent too big and reflects a social bias rather than an academic selection. Independent schools account for only 6 per cent of secondary education but this distills into 16 per cent of the sixth forms, and 29 per cent of undergraduates nationally.

Is there really a social bias, or is Oxford merely a further stage in the ability distillation process which will eventually deliver captains of industry, and dons, and even members of parliament? Is 52 per cent, declining at less than 1 per cent per annum, an unreasonable proportion of undergraduates from independent schools? Much concern has been expressed in Oxford about the difference of the success rates for applicants from maintained and independent schools.

There are quite big differences between the popularity of the various subjects between men and women and, more surprisingly, between independent and maintained schools. Why are the applied sciences, engineering and medicine, populated 60-40 in favour of independent schools whereas the big pure sciences, physics and chemistry, are 60-40 in favour of maintained schools?

Apparently maintained school pupils have only one chance in three of getting a place whereas their competitors from independent schools have nearer one chance in two. In fact the difference is meaningless. Most independent schools present their candidates after A levels and the weaker potential candidates withdraw because of poor A level grades and consequently make the success rate look good. If there is any inference to be drawn from success rates it would concern the large increase in the number of maintained schools which have been persuaded that it is reasonable to enter some of their pupils in the Oxford competition.

A much more substantial criticism can be made that selection for Oxford is by achievement, rather than potential, thus conferring an advantage on those schools which are particularly skilful at preparing their pupils for examinations.

It is very difficult to believe that there is any significant bias among Oxford tutors in favour of independent schools (despite the odd few spectacular examples to the contrary "justified" by the prospect of a better reflection of the educational needs of a future ruler). But there is a reason to suspect that selection is more by achievement, which is what examinations are about, than by promise.

It is not easy to spot untrained talent, particularly when the view is obscured by examination marks, but all is revealed (in some sense) three or four years later when the final class lists are published. In between, the undergraduates from about 2,000 different schools have been jumbled up in 28 different colleges, variously suffered and enjoyed common tutorials and lectures, and written examination papers for the examiners who have not the slightest idea of the social or educational origins of their examinees.

Only when the class lists are published in the newspapers is the name of the old school attached to the name of an undergraduate. Sifting these class lists and identifying schools gives the number of first, second and third classes obtained by the ex-pupils of maintained and independent schools separately, as in table 1. Undergraduates from overseas and other universities and those who did not record an old school have been excluded from the tables, but in total there were only 109 such.

The big differences are in the percentages in the first class. Men from maintained schools win the competition comfortably, whereas the



Oxford: Is the strawberries and champagne image fair?

women from the same schools lose horribly. There is very little chance indeed that the differences are just a statistical fluke.

About a third of all women are in the three remaining women-only colleges, but that does not explain the low percentage of first classes. Women in mixed and single sex colleges score almost exactly the same proportion of firsts. On the other hand the women's colleges collect rather more than their fair share of third classes (nearly 12 per cent) and it looks as if they are dipping too deep into the pool of talent in their efforts to fill their places. If the women's colleges are excluded from the statistics then all four groups score a nearly uniform 10 per cent thirds. A fixed percentage of thirds and a variable percentage of firsts could mean that the final examiners are distributing the thirds at random, but it is more likely that undergraduates fall by the wayside for other reasons than incompetence.

There are quite big differences between the popularity of the various subjects between men and women and, more surprisingly, between independent and maintained schools. Why are the applied sciences, engineering and medicine, populated 60-40 in favour of independent schools whereas the big pure sciences, physics and chemistry, are 60-40 in favour of maintained schools?

And why is the balance the other way round for the "applied" arts of Law and Politics, Philosophy and Economics and the "pure" arts of English and history?

Independent of the balance between type of school or men and women we observe that in nearly all subjects the men from maintained schools do well and the women from the same schools relatively badly. Engineering does not count as there are too few women reading the subject. It seems unsurprising that men generally obtain better results than women in the sciences and PPE, and that the reverse occurs for English, but the breakdown by subjects provides no hint of an explanation for the differences associated with the type of school.

For many colleges, 1982 was the first year in which their women undergraduates reached the stage of finals, and the proportion of men and women in colleges is highly variable and probably nowhere near the equilibrium that will be achieved in a few years time. It also follows that the proportions of independent to maintained schools may also change depending on what applications the college receives. It is worth adding that the proportions of men/women and independent/maintained for any one college reflect quite accurately the proportions of the applications received. There is no evidence at all

that any college exercises a bias in favour of undergraduates of a particular origin, but it is quite clear that undergraduates of a particular origin exercise a bias in favour of certain colleges.

Allowing for the statistical fluctuations, which always occur with small numbers, there is no correlation of any one college or group of colleges with the relative success of men and women or maintained and independent schools in finals. There are big differences between the proportions of first and thirds obtained at the various colleges but that is a matter of the Nottingham league table and has no obvious connection with any social bias.

It is notoriously difficult to draw firm conclusions from statistical evidence, but those who are familiar with standard deviations and chi-squared tests will certainly agree that the men from maintained schools do well, the women from maintained schools do badly, and the men and women from independent schools break even. They might further agree that there is no evident correlation with subjects of study or colleges, except perhaps the small excess of thirds at the women's colleges.

Now if we suppose that the sole object of selection by dons is to secure the best results in Oxford finals and that 10 per cent of the irreducible thirds is unrecognition at the time of admission, then the following changes would occur: men from maintained schools would increase by 37 per cent; men from independent schools would decrease by 2 per cent; women from maintained schools would decrease by 49 per cent; women from independent schools would decrease by 11 per cent. This will give proportions of men/women of 77/23 and independent/maintained of 50/50, which is likely to offend against the Sex Discrimination Act and will certainly not satisfy Mr Whitehead's committee.

The false assumption hidden behind this dubious logic is that the pattern of applications to Oxford remains unchanged from year to year. The freshers who came up in October 1982 have a proportion independent/maintained of 49/51 compared to 52/48 for the finalists 1982 who came up in 1978 or 1979. Almost all of the more able pupils at maintained schools being willing to have a go at Oxford. It is thought that the reluctance to try now stems not so much from the schools themselves but from the pupils who feel that they may not be very comfortable in the mythological social scene portrayed by *Brideshead Revisited*. The Labour Party committee might like to give a thought to the way in which they might persuade pupils at maintained schools that the places at Oxford are there for the taking, rather than threatening quotas.

The authors are the tutor for admissions at Hertford College, Oxford, and his son, an undergraduate at the University of Durham. Durham University's help with computing facilities is gratefully acknowledged.

TABLE 1

Class	No. of undergraduates	% in each class				All
		Men	Women	Men	Women	
I	335	12.4	17.6	11.5	7.0	12.8
II	2008	76.7	72.5	78.8	81.8	76.7
III	278	10.9	9.9	9.9	11.2	10.5
Total	2619	100.0	100.0	100.0	100.0	100.0

TABLE 2

Subject	No. of Candidates	% in each class		First classes %			
		Men	Women	Men	Women	Men	Women
		Ind/Maint	Ind/Maint	Ind	Maint	Ind	Maint
Biological sciences	187	56/44	49/51	10	18	13	10
Chemistry and biochemistry	209	76/24	41/59	18	17	11	3
Engineering and metallurgy	134	90/10	61/39	14	22	0	17
Mathematics	170	72/28	48/52	15	19	0	8
Medicine	97	57/43	62/38	11	25	12	0
Physics	170	82/18	39/61	17	21	8	12
All sciences and mathematics	967	72.8/27.4	48.3/51.7	14.7	19.5	8.4	7.5
Classics	110	69/31	71/29	21	33	29	6
English	264	50/50	58/42	7	11	13	11
Geography	88	67/33	57/43	6	7	6	0
History	327	65/35	59/41	12	14	7	5
Languages	294	61/39	54/46	15	21	17	9
Law	225	66/34	48/52	7	9	11	6
Music	48	48/52	46/54	8	9	20	7
Politics, Philosophy and economics	244	75/25	48/52	8	19	9	0
Theology	52	71/29	40/60	6	29	20	10
All arts	1652	63.6/36.4	54.7/45.3	11.1	16.0	12.8	6.7
All subjects	2619	66.9/33.1	52.3/47.7	12.4	17.6	11.5	7.0

TABLE 3

College	No. of undergraduates	% in each class		% First classes				Men & Women		Northington
		Men	Women	Men	Women	Men	Women	Ind	Maint	
		Ind	Maint	Ind	Maint	Ind	Maint	% I	% II	
University	96	78/22	53/47	26	25	25	0	22	6	+16
St Catherine's	118	69/31	42/58	9	25	20	10	17	6	+11
Wadham	84	66/34	45/55	16	18	24	0	16	4	+11
Hertford	94	64/36	29/71	13	20	22	0	14	5	+9
New	114	82/18	68/32	20	21	22	25	21	12	+9
Orford	77	100/0	64/36	14	25	0	0	18	9	+8
Balliol	102	81/19	60/40	20	24	18	13	21	13	+8
St John's	86	81/19	56/44	13	26	11	14	17	9	+8
Brasenose	80	64/36	54/46	24	21	11	0	16	9	+8
Jesus	82	51/49	35/65	13	12	23	7	12	5	+7
Worcester	86	77/23	66/34	14	18	0	17	14	10	+4
Lincoln	71	73/27	54/46	19	19	0	0	14	11	+3
Queen's	81	86/14	54/46	10	21	0	0	12	9	+3
Keele	88	84/16	55/45	10	23	13	0	14	12	+2
Lady Margaret Hall	101	83/17	53/47	0	17	12	14	11	9	+2
St Hilary	101	91/9	50/50	0	15	6	13	11	0	+2
Pembroke	87	82/18	51/49	8	15	0	22	11	11	0
Trinity	73	85/15	56/44	11	12	20	0	11	11	0
Somerville	98	0/100	50/50	0	8	14	11	12	1	-1
Corpus Christi	46	78/21	44/56	7	16	0	0	10	11	-2
Halls etc.	57	88/12	51/49	0	17	0	25	8	11	-2
St Edmund Hall	97	85/15	56/44	13	11	0	0	10	12	-2
Exeter	84	83/17	55/45	5	11	25	0	7	10	-3
Merton	63	100/0	51/49	9	13	0	0	11	14	-3
St Peter's	84	86/14	44/56	3	8	0	0	5	8	-3
Magdalen	92	89/11	58/41	12	10	0	13	11	15	-4
Christ Church	119	92/8	86/14	8	17	0	4	16	16	-6

Where now for American political science?

James Manor looks at the aftermath of a trouble decade

Over the last decade or so, the study of politics in American universities has changed, not beyond all recognition, but quite substantially. The old dominance of pluralists and behaviourists has been greatly eroded. New and, by American standards, somewhat exotic topics and modes of inquiry have gained ground. The prevailing mood is one of uneasiness and a lack of collective cohesion, tempered by hope of renewal and a sense of being in transit to destinations that are as yet unknown.

The new trends are partly the result of changes which are external to the profession, changes in the American and international political scenes. The nation's domestic troubles have had a particularly powerful impact. Most political scientists appear to feel at least a mild anxiety at the state of the country, and a sizable minority foresee an early "crisis of regime" akin to those of the 1840s or the 1930s.

Many things feed their fears. The severity of the recession in recent years in the older industrial centres of the northeast and midwest has compounded the already appalling problems of long-term economic decline and the maintenance of the social fabric there. The dispersal of power and resources within the existing federal structure seems certain to divert those who seek a spirited attack on the crisis of decaying cities, yet there is no realistic prospect of altering that structure.

The major party organizations have wasted away as television, opinion polls and direct mail techniques increasingly perform - often perversely - their former tasks. Parties have become well nigh incapable of forging broad coalitions by arranging bargains between varied interests. It is therefore easier for single-issue pressure groups - campaigners, as one was put it, for "unborn gay whites", or often for powerful corporate lobbies - to inflame and oversimplify public discussion, and divert attention from fundamental problems.

Politicians' heavy use of television advertising at election time has increased their dependence on money, and has led to the ludicrous trivialization of political debate.

Political analysts who are worried because a simple-minded, telegenic smoothie now occupies the White

House are patently alarmed about a likely further devaluation of political debate producing more of the same, or worse. Deep popular anxiety over economic troubles, social disintegration and the decline of American power in the world has created major opportunities for stylish televised demagoguery. This has been something of a growth industry among purveyors of religion in recent years and it seems only a matter of time until politicians get in on the act.

All of this has left many scholars shaken. There was a time when political scientists and historians in the United States tended to treat the American case as unique and inspirational. This sort of fervour was central to much of the writing of, for example, Henry Steele Commager, and even figures of the stature of Carl Becker occasionally succumbed to this illusion. Today, serious scholars are apt to be much more cautious and critical in their judgments.

Events in the international arena have also generated challenges to old verities. The world no longer seems so tidy, predictable, encompassable, comprehensible as it once did. Few now share the old confidence that other societies and politics will gradually become more "modern", secularized, pluralist, prosperous, rational and liberal - that is, more like America was once seen to be. That and other notions of "progress" seemed plausible in the boom years of the late 1950s and the early 1960s, when the vivid memory of the Marshall Plan and the recovery of Europe provided a metaphor for what was to come.

In the wake of events in Iran and elsewhere, the process of "modernization" now seems as likely to frighten and deracinate people as to make them more rational. As a result, political scientists are moving into fields which for a long time were largely ignored. One of these is the study of religion.

In the great days of liberal optimism, religion was often regarded as something close to "superstition" which would be burned away by the forces of modernity and secularization. Scholars who studied religion and politics were seen to be eccentrics, wasting their time on what was then considered an anachronism. The profession was therefore unable either to anticipate or to explain the Iranian revolution.

It is said that when it occurred, even the Central Intelligence Agency (CIA), which had long imbibed the assumptions of American political

science, found that it had not a single religion specialist to make sense of the Islamic revival. In recent years, there has been a major surge in the study of religion and politics thanks not only to the Ayatollah but to events in Poland, the transformation of the role of the church in Latin America and the huge growth of cults - Christian and otherwise - in the US.

Perhaps the most remarkable change in recent years has been the surprisingly widespread loss of confidence in behaviourism, which once enjoyed pre-eminence in and lent cohesion to the profession. To say this is not to claim that behaviourists now feel that their methods yield dubious results. Their faith in their techniques and in what must of them still call "scientific rigour" remains largely undiminished.

What has evaporated is the belief that by understanding political behaviour, we can learn nearly everything that we need to know about politics.

In their heyday, behaviourists in political science departments actually led sociologists, economists and others on the great trek away from studies of the role of the state in human affairs.

Times have changed. From one end of the ideological spectrum to the other, people have realized that the state plays a major role in politics and other spheres of life. I was told repeatedly that the state is "an ideological construct worthy of study", that it is "an entity possessed of a logic and a set of imperatives of its own", that "we need to know what people perceive and expect the state to be". All of this may be old hat in most British politics departments, but in America these days it is often proclaimed as new. Scholars are dusting off books by political philosophers who deal with the state, so that "political theory" once again means more than social and behavioural theory.

These discoveries are impelling American political scientists into a whole range of interdisciplinary efforts. What is the relationship between the state and cultural pluralism, the state and market forces, the state and social change? What interplay of state structures and socioeconomic forces cause democratic regimes to break down in Latin America, survive in India, emerge in Spain or fail to emerge in much of capitalist east and southeast Asia?

Questions of this kind have captured the imagination not just of

many political scientists, but of those in the citadel of the establishment itself, the American Social Science Research Council, as the State Department's long essay on "Bringing the State Back In" indicated in last June's issue of the council's bulletin.

If behaviourism has been de-throned, no new school of thought has yet replaced it. The lack of focus which results has been greeted with mixed feelings. A single conversation can yield, on the one hand, incoherent comments about "losing our way" as the profession fragments into a bewildering array of poorly integrated sub-fields and, on the other, expressions of excitement with "this time of ferment" and the "wide open nature of the field".

A clearer understanding of this situation may emerge from a close look at a lament which cropped up occasionally in talks with senior professors. They tend to bemoan the fact that the profession now seems incapable of producing younger scholars of genuinely startling brilliance. As they look round, they are unable to locate present-day counterparts of Robert Dahl or Seymour Martin Lipset who were so conspicuous in their thirties. This is not just the grumbling of ungenerous old men. Conversations with younger scholars produced plenty of forceful refutations of this generalization and abundant nominations of young geniuses to disprove it, but not the faintest consensus on whom the new stars were.

There are good reasons for this. To establish one's self as a young (or indeed a middle aged) giant, it is necessary to present new views which have wide-ranging implications. That is only possible if one is first able to synthesize ideas from a broad array of sub-fields, and it is precisely this that has lately become more or less impossible.

The dispersal of American political scientists into so many new and not-so-new specialisms, and the highly specialized character of most postgraduate programmes naturally discourages would-be synthesizers. They fear that attempts to write books of broad relevance may attract severe reviews from specialists whose sub-fields they have failed to master. It is far more difficult today than 10 or 15 years ago to write a book which everyone will feel they must read.

To discuss such books in America today is again to encounter emotional cross-currents. There is a good deal of nostalgia among both older and younger scholars for the days when challenging works on general

themes appeared quite often. But many of the same people also display a certain distaste for the authors of such books. They regard grand synthesizers as over-hasty entrepreneurs who tried to "get rich quick", as mere "essayists" who lacked rigour and an adequate grounding in a specialism or in empirical research.

The trend today is towards a scaling down of the ambition to invent grand concepts. Even those who still seek to generalize now feel compelled to anchor their assertions in one or a small number of case studies. And yet despite all of this, nearly every conversation eventually swings back round to the need for new paradigms, new micro-systemic theories to help scholars to gauge the importance of their specialized studies and to make sense of what many see as a systemic crisis in American politics.

One important development among a minority in recent years, which is a response both to the need for synthesis and to the sense of impending crisis in America, is the growing popularity of Marxist modes of analysis. The nation's dilemmas have impelled scholars from a wide range of disciplines to seek radical alternatives to established theories. Many have swung to the right, to the so-called "neo-conservatism" of the Irving Kristols and Jeanne Kirkpatrick. But those turning left appear to have found a richer and more coherent body of thought awaiting them.

Dissatisfaction with what is seen as the failure of pluralists and structural-functionalists to deal adequately with inequality, exploitation, class formation and change over time has grown significantly in recent years. Things which were once taken as given, such as the nature of the state and its relationship to society, are now widely seen as problematic. The growth of specialization, the increasingly disparate character of the profession and the sense of systemic crisis have all made Marxist analysis more attractive since it asks the kind of macro-systemic questions which now seem called for.

This shows no sign of becoming the view of the majority, which remains liberal-to-centrist. Statements such as Charles E. Lindholm's 1982 essay in the *American Political Science Review* are still regarded as somewhat eccentric by most political scientists in the more renowned departments. And the excruciating pressure of the race for tenure tend to check the leftward trend among younger people.

In respectable institutions, this is the result not of latter-day McCarthyism but of a refusal by many senior academics to accept the Marxist tradition as a sufficiently rich mode of analysis.

The baleful influence of the tenure system, which made sense in more affluent times but which has grown increasingly poisonous as funds and permanent appointments have dried up, is evident in many other ways.

Many untenured political scientists seek to insure against unemployment by turning to marketable topics of study. Public policy, management techniques and the politics of energy and high technology are very hot at the moment. Projects related to business, defence and national security are particularly fundable under the present administration. Some of these efforts generate useful insights into the workings of political systems, especially in the field of political economy. But a great many turn out to be tedious exercises tailored to the uninspiring demands of the "market" (real or imagined) or to the specifications of government contracts.

In sum, then, American political science today is less confident and cohesive than it was. It faces severe problems in rearing up the next generation of scholars and in formulating ideas that might help the nation to cope with multiple vexations and to renew itself. But the profession is also more open-minded, interesting, creative and perhaps more realistic than it has been for a very long time.

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by Adam Kuper

Margaret Mead and Samoa: the making and unmaking of an anthropological myth
by Derek Freeman
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Anthropologists are always slanging one another - they are quite as bad as literary critics - but few have enjoyed such public attention as Professor Freeman has received for his critique of Margaret Mead. There is a perceptible element of *schadenfreude* about much of the press commentary, and Professor Freeman's critique is rough and uncharitable even by anthropological standards. But, then, in his view, great issues are at stake, and so the gloves are off.

Margaret Mead went to Samoa in 1925, at the age of 33. Slightly built and looking even younger than her years, she had never been abroad or on a ship, had never spoken a foreign language or stayed in a hotel by herself. In fact, I had never spent a day in my life alone. Her formal preparation was minimal. "I had a half hour's instruction in which Professor Boas told me that I must be willing to seem to waste time just sitting about and listening."

Yet she was not wholly unprepared. She had completed a thesis on Polynesian cultures, based on secondary sources, and she had absorbed a point of view about culture from Boas. If there was "no how" in our education," as she said, she had learned "what to look for". Professor Freeman believes that Margaret Mead was only too aware of what she had to look for. She was, in his view, sent out to find an illustration of a theoretical proposition, and this commitment biased her observations.

The first part of Professor Freeman's book sketches the confrontation between the eugenics movement and Boasian anthropologists in America, which came to a head at about the time Margaret Mead went into the field. Together with many psychologists, Boas and his students were emphasizing the independence of mental processes, the distinct characteristics of what Kroeber termed "the superorganic". In 1924 Boas said that the problem was to differentiate "between what is inherent in bodily structure, and what is acquired by the cultural medium in which each individual is set". He called for "a scientific and detailed investigation of hereditary and environmental conditions". Freeman comments that: "Within a few months he had planned just such an investigation, and had found in the 23-year-old Margaret Mead the very person to carry it out."

But it was not so simple. Margaret Mead has explained that Boas was reluctant to allow her to work outside the United States. He agreed that she could go to Samoa only on condition that she studied adolescent girls, because that was likely to be a safe and relatively easy group for an inexperienced young woman to work with. Margaret Mead accepted, in part, because she believed that too little work had been done on the point of view of women and girls in "primitive societies". In her autobiography she cited a letter Boas wrote to her when she went into the field, which certainly does not bear out Professor Freeman's contention that she was sent to perform the crucial experiment in the nature/nurture controversy. "One question that interests me very much is how the young girls react to the restraints of custom," Boas wrote. He pointed out that in America the adolescent was often rebellious or sullenly submissive, and suggested that these attitudes expressed a frustrated desire for independence. "I am not at all clear in my mind in how far similar conditions may occur in primitive society and in how far the desire for independence may be simply due to our modern conditions and to a more strongly developed

individualism." "Stick to individual and pattern problems," he urged. Not a word, here, about biology or about experiments, and Mead's results are in no way foreshadowed on these points. It is true that in the introduction to her popular book she did claim that it represented a crucial experiment in the nature/nurture debate, but there is no evidence that she really thought of her study in this way from the start.

However, when she arrived in Samoa Margaret Mead appeared to be as susceptible to accident as any of us. The boat carrying her grant cheque was six weeks late, so that she could not leave the hotel. It was two months before she got into the field properly, rather casually choosing the Manu islands. "Everyone agreed that the Manu islands were much more old-fashioned and were, therefore, much better for my purposes."

In Manu's she chose to live in the American naval dispensary, writing to Boas that she had decided not to live with a Samoan family because of "the loss of efficiency due to the food and the nerve-racking conditions of living with half a dozen people in the same room in a house without walls, always sitting on the floor and sleeping in the constant expectation of having a pig or a chicken thrust itself upon one's notice". This was certainly a choice which Malinowski's students would have reversed, but in her autobiography she pointed out some real advantages. "Living in the dispensary, I could do things that otherwise would have been wholly inappropriate. The adolescent girls, and later the smaller girls whom I found I had also to study, came and filled my screen-room day after day and night after night..." Her letters home reflected doubts rather than programmed certainties. "The truth was that I had no idea whether I was using the right methods? There were no precedents to fall back on."

Her time on the Manu island of Tau was devoted to the study of fifty girls, and it was concentrated on a period of four months, interrupted by the hurricane and by school terms. This provided the material for *Coming of Age in Samoa*, which was published in 1928 and became one of the bestsellers of the generation. But Margaret Mead spent nine months in all in Samoa, and while this was a short time by anthropological standards she also managed (despite her brief from Boas) to collect more general ethnographic information, mainly on other islands, and in 1930 her sober *Social Organization of Manu'a* was published by the Bishop Museum in Hawaii. It attracted the attention only of specialists.

Coming of Age in Samoa therefore represents only the results of a brief, interrupted, apprentice study, made by an inexperienced young woman in the pioneering days of field anthropology. Moreover, the book itself - in contrast to her 1930 monograph - was aimed at a popular market. It is a short book; nearly a quarter of it is devoted not to Samoa at all but to the problems of education in the United States. This is the study which Professor Freeman regards as important enough to warrant a solid volume of criticism more than half a century later. His substantive criticisms in fact addressed to chapters three to twelve of *Coming of Age*, in which Margaret Mead describes the life cycle of Samoan women.

Margaret Mead concluded that Samoan women moved easily from childhood through adolescence to adulthood without suffering difficult adjustments and strains. In Samoa "adolescence represented no period of crisis or stress, but was instead an orderly developing of a set of slowly maturing interests and activities. The girls' minds were perplexed by no philosophical, troubled by no remote ambiguities, beset by no remote ambitions. To live as a girl with many lovers as long as possible, and then

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Love under the palm trees



Margaret Mead in Samoan dress

to marry in one's own village, near one's own relatives, and to have many children, these were uniform and unproblematic."

The final two chapters of her book drew the moral for America. The disturbed adolescence typical of America was due to sexual inhibitions, to "the evils inherent in the too intimate family organisation", and, above all, to the fact that the American child was confronted with a bewildering variety of choices - between religions, political loyalties, moral standards, and career possibilities. Americans should therefore encourage tolerant sexual attitudes, loosen the grip of the nuclear family, and design an educational system which would equip a young person to make rational choices. It was without any question this moral which earned the book its popularity, and from the first Margaret Mead was at least as interested in the "applied" side of her work as in its theoretical significance. "I have spent most of my life studying the lives of other peoples, faraway peoples," she wrote in her autobiography, "so that Americans might better understand themselves."

Professor Freeman is concerned to demolish Margaret Mead's "negative instance", her claim that in Samoa adolescents were untroubled by their developing sexual maturity. This has not been the work of a day for Professor Freeman. He first did field work in Western Samoa in 1940, staying for two years and discovering that at least in his part of Samoa, fifteen years after Mead's time, things were not as she had described them. "By the time I left Samoa in November 1943 I knew that I would one day face the responsibility of writing a refutation of Mead's Samoan findings." He subsequently carried out archival research, and after taking up a post at Canberra in the

1960s, he regularly revisited Samoa to build up his case. He did not regard his research as complete until he could study the archives of the American courts of Samoa for the 1920s, and so, after Mead's death, his book only after Mead's death, in 1978. He says, however, that he told Mead the basis of his criticism in 1964, but does not record her answer.

The first part of Freeman's critique deals with Mead's general picture of Samoa (or at least Manu'a) as a tolerant, relaxed, flexible, traditional society. But since it is the nature of adolescence and the experience of women in Manu'a that is most germane to the argument, and it was on these matters that Mead did her most systematic research, so I shall concentrate on these issues.

Beginning with child rearing, Mead emphasized that in Manu'a a child could diffuse his dependence, taking up with a series of surrogate parents, running free in a broad extended family. Freeman argues that in Samoa, as elsewhere, the mother-child bonding is crucial, that adoptive relationships are rare, and that strong attachment to biological parents is the norm. Mead argued that children were indulged and enjoyed great freedom, but Freeman insists that parental discipline is strict, frequently violent, and that children are conditioned to accept authority without question. Children initially react with anger to this strict discipline, but are cowed by the threat of even more severe punishments. In consequence there is considerable covert hostility to parents.

A vital part of Mead's argument (and an important element in its popular appeal) was her observation that the Samoans did not suffer from sexual frustration. She did, however, admit that there was one snake in the grass - the *moetotolo*, or sleep crawler. "The *moetotolo* is the only sex activity which presents a definitely abnormal picture. Ever since the first contact with white civilization, rape in the form of violent assault has occurred occasionally in Samoa. It is far less congenial, however, to the Samoan attitude than *moetotolo*, in which a man stealthily appropriates the favours which are meant for another."

Freeman is scornful of this version. Samoans greatly value virginity, and when a girl marries her virginity is publicly tested in a defloration ceremony in which her husband breaks her hymen with his finger. Freeman insists that virginity is normal until marriage - he and his wife even did a virgin census in one village (though presumably without the finger test). All this puts the activity of the sleep crawler in a very different light. He is not simply filching the prerogatives of an established lover: rather he is raping a virgin. And (contrary to Mead again) open, forceful rape is also a common Samoan custom. In both cases the aim is above all to insert fingers in the vagina to break the hymen. The girl thus deflowered is now left with no alternative but to marry her rapist. And that is the goal of the exercise.

Freeman has less to say on the crucial issue of adolescence. The thrust of his argument is that the Samoan youth are a fractious, violent lot and he provides statistics to show that the boys have a record of delinquency which compares unfavourably with that of the deprived youth of Chicago.

In the 1960s Margaret Mead recognized that the accounts of later observers in Samoa tended to diverge from her own on many points. She suggested two possible explanations for this. First, it was possible that she had happened upon an island, or a group of islands, that differed from mainstream Samoan culture, perhaps only temporarily. Freeman rejects this argument, and he has observations from Manu'a to back him up; but it is possible that at least some of the divergences might

be explained in this way. The second possibility she put forward was that she had inadvertently adopted the perspective of the girls with whom she had spent most of her time, and who would perhaps have a partial or distorted view of Samoan culture as a whole. This might again account for various divergences in her account, but it cannot explain away the apparent error in describing adolescent sexuality. Freeman proposes an uncharitable version of this reasoning. In his view she was indeed the prisoner of her girlish subjects, but instead of telling her the true facts of their existence they systematically duped her, with "countervailing tales of casual love under the palm trees..." Of the three explanations on offer I find this the least plausible. I once spent a week interviewing the formidable Dr Mead for a BBC *Horizon* programme, and I find it difficult to believe that she could have been systematically duped by a group of village children over a period of several months, even as a young woman.

Freeman's critique is vulnerable on some points. His crucial section on adolescence, for instance, is thin, and it does not inspire confidence to find Professor Freeman citing figures on adolescent delinquency published by the notorious fraud Cyril Burt. However, while the critique is turgid, humourless, grudging, uncharitable and sometimes lacking in judgment, it must be conceded that it is thorough and it can probably be broadly accepted. Margaret Mead got it mostly wrong. The question now arises, does it matter much?

Professor Freeman thinks it matters very much indeed. He does not see himself as a senior professor scourging the apprentice work of a young student of long ago. On the contrary, he is engaged in a heroic assault on a dominant myth of contemporary anthropology. This is very difficult to swallow. Even in the 1930s the Boasians had better case studies at their disposal (including Margaret Mead's later work in New Guinea). It is true that Boas and several others lavished extravagant praise on *Coming of Age*, but it was never the mainstay of their theory. Moreover, after the Second World War American anthropologists - Margaret Mead in the vanguard - began to take a much more subtle and sophisticated view of the relationship between culture and heredity. Certainly today nobody in the profession would think of rejecting the extreme cultural determinist approach. In consequence, the impact of Professor Freeman's critique must be less devastating than he seems to imagine.

What Freeman does demonstrate is that Margaret Mead's Samoan study was a rather poor piece of work by a young, barely trained graduate student with imperfect command of the vernacular - but who later went on to carry out more sophisticated and successful field studies in the Pacific. Margaret Mead was never an ambitious theoretician, and her theories were never very influential in anthropology. Her genius was to use exotic materials to point a moral about American culture.

Then why all the fuss now? *Coming of Age in Samoa* became a best-seller because it seemed to offer a "scientific" basis for a new educational policy. Tolerance of alternative mores, the acceptance of greater sexual liberty, the restraint of parental authority, all were granted a new legitimacy. Of course, these developments were not universally welcomed. Today they are generally in disfavour. Professor Freeman's book has therefore been welcomed by millions who will never read it, but who believe that it justifies stricter discipline, more sexual restraint, and suspicion of experiment. Margaret Mead's response would have been worth reading, but she left enough admirers behind her, including Pacific specialists, to ensure that her reputation will not lack defenders.

The debate is just beginning. Adam Kuper is professor of anthropology at the University of Leiden.

The book which impressed me most deeply in my youth was Goethe's *Faust*; it has continued to influence my thinking ever since. I first read it at the age of 16 and have returned to it again and again. The earliest effect on me of *Faust*, *Pandora* and the poems of Goethe was to make me wish and try to become a poet. After I decided to make philosophy my life's work, I always felt greatly encouraged when my philosophical position was in harmony with the poetic content of *Faust*. To discern such harmony is not to imply that a work of art could be represented by or reduced to a set of philosophical theses. Such a view seems quite fatuous to me. Without trying to explain the possible harmony or disharmony between a work of art and one of philosophy, I shall give two examples of the way in which I take my own philosophical position to be in harmony with Goethe's great tragedy.

My first example refers to a philosophical problem which has occupied me for a long time and which I have discussed in my writings on the philosophy of mathematics and science. It is linked to the contrast between two kinds of thinking. One kind, which Mephistopheles pretends to despise and ridicules as drilling an individual's spirit and forcing it into inquisition boots, is thinking which is constrained by the strict rules of logic and the mathematically formulated sciences. The other kind which he praises as genuine thinking, he compares to a master craftsman's art of weaving, where one shuttle moves a thousand threads and makes a thousand consciousness. Mephisto-

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Stephan Körner chooses Goethe's *Faust*

apophanes' advice to the student to abandon any attempt at thinking of the first kind is part of his scheme to make him despise "reason and science, the very highest power of man".

The difference between, and the interaction of, logico-mathematical thinking which is governed by strict rules, and common sense thinking which is governed by looser guidelines, have occupied philosophers since ancient times. Among influential modern philosophers Frege argues that thinking when properly purified becomes thinking of the first kind, while Wittgenstein asserts that a philosopher's attempt to ask and answer questions after the fashion of science is bound to lead him or her "into complete darkness". Yet it can be argued that the appreciation of mathematical and mathematically formulated scientific theories to empirical phenomena - and its philosophical description - involves thinking in both the weaver's and the logician-mathematical way. For the application of these theories to empirical phenomena requires, first, that we describe our experience of "life's green tree" in the weaver's idiom; second, that we transpose this description into the constrained language of "grey theory" and draw

conclusions within its framework; last, that we transpose these conclusions back into the language of theoretically unconstrained, living thought.

My second example is Goethe's conception of man which pervades the whole of *Faust*. Man for Goethe is "the little god of the world" who has the power of free choice and creation - an aspect of man's nature which Mephistopheles fears and hates. Goethe's conception is shared by Kant, who rejects the image of man as a "rational jack", having once been wound up", or as we might say today, programmed, "executes its movements by itself" without choosing them. The problem of man's real or apparent freedom belongs to speculative philosophy. That is to say that even after a concept of freedom has been clearly defined, its applicability to human existence cannot be demonstrated. All that can be done - and all that I have tried to do for a concept of freedom resembling Goethe's and Kant's - is to show that it is internally consistent, that its applicability is consistent with the best available logical and scientific knowledge and that it does not offend common sense.

That a concept of real freedom need not offend the common sense of those who live in the tradition of Western

culture - be they believers, atheists or agnostics - can, I think, be supported by distinguishing between the creative power of the biblical God and the creative power of man, whom He created after His own image. God's creative power is according to the book of Genesis twofold: He has the power to create out of nothing, as well as the power to impose order on chaos. I see no difficulty in ascribing some measure of the latter power to man, that is, not the power of *creatio ex nihilo*, but the power to impose some order on comparative chaos or disorder. In making this point, I am once again encouraged by a harmony between my philosophical position and Goethe's poetic work. I am also pleased that my philosophical conclusion is not at all troubled by my thinking of Goethe, Mozart, Kant or Einstein as little gods and not as "rational jacks" of an admittedly very complex structure.

Goethe's occasional explicitly philosophical remarks have often been misinterpreted. Oswald Spengler, the author of the *Decline of the West* is not alone in seeing a fundamental opposition between the content and the method of Goethe's and Kant's thought. To Spengler, Goethe stands for an intuitive philosophy of becoming, Kant for an analytical philosophy of pre-existing fact. This was not at all Goethe's view for he admitted the "great fundamental thoughts" of Kant's third *Critique* and regarded them as "wholly analogous to his own past work", because they clearly express the "inner life of art and nature and their interaction..."

The author is professor of philosophy at Yale University, Connecticut.

BOOKS

Military power

The Pursuit of Power: technology, armed force and society since AD 1000
by William H. McNeill
Blackwell, £15.00
ISBN 0 631 13134 5

This bold and generally persuasive survey of Far Eastern and European history over a thousand years can be read on two levels: as a quasi-scientific discourse or as a more straightforward account of the evolution of military power in its economic, technological and political context.

In his preface the author describes the book as a twin of his earlier study *Plagues and Peoples*, and whose theme is "changes in patterns of macroparasitism among human kind". Alterations in armaments are likened to "genetic mutations of micro-organisms in the sense that they may... open new geographic zones for exploitation, or break down older limits upon the exercise of force within the host society itself". Fortunately Professor McNeill has refrained from using the language of epidemiology and ecology and only occasionally reminds the reader of these underlying interests.

Between about AD 1000 and 1500 China set the pace in military technology, developing the cross-bow, guns and warships, until overseas exploration, financial investment and scientific experiment were stifled by bureaucracy in the service of cultural isolationism. Arguably the same course would have been followed in Europe had the papacy, with its hostility to the ethos of the market place, achieved effective sovereignty. Instead the emergence of a congeries of city states and petty kingdoms permitted a merger of market forces and military institutions. The commercialization of organized violence was epitomized by the prominence of mercenary armies in the fifteenth century. Machiavelli's hostility to mercenaries has been echoed by generations of historians, but McNeill suggests the renewed preference for professionals to citizen soldiers in our own times should cause us to view the defence arrangements of the Italian cities more sympathetically.

The development of bronze, brass and eventually iron guns from the late fifteenth to the mid-seventeenth century is described in great detail, but always with a view to artillery's wider effects in terms of internal unification and overseas conquest. As McNeill neatly puts it, the extent of the Mughal, Muscovite and Ottoman empires was defined in practice by the mobility of their respective gun parks. West European states outstripped the Eastern empires mainly because of the intense competitive development of weapons resulting in a superior combination of

warships and artillery. This made possible a remarkable period of overseas imperialism.

Naval warfare tended to be more profitable than land operations. McNeill argues that the noblemen who played leading roles in European armies were for the most part contemptuous of pecuniary calculations. Their ideals of martial prowess and honour were fundamentally at odds with the financial, logistic and administrative aspects of military management. By contrast, knightly orders were firmly subordinated to finance in the fitting out of ships for long voyages, and investors carefully measured their costs against prospective returns in a way that was seldom possible in land warfare. This was, however, only a matter of degree. Early modern armies were usually an aggregation of independent companies each raised and equipped by a captain who was as much an entrepreneur engaged in a business transaction as a purely military careerist. Land conquests yielded booty and ransom payments to the officers but often impoverished the state. Siege operations in particular were notoriously expensive and indecisive. Philip II of Spain had to repudiate his debts on four occasions and never managed to pay his soldiers on time. Nevertheless McNeill sees warfare, and the escalating costs of waging it, as providing much of the dynamism behind European commercial and political progress.

By the eighteenth century overwhelming force resided in armies obedient to kings and prepared to crush either aristocratic rivals or lower class rebels. Accordingly, Europe began to enjoy a previously unattainable level of domestic security which facilitated a remarkable increase in wealth. The most powerful states could now support professional standing armies on tax income without exhausting the economic resources of the population. With characteristic originality, McNeill focuses on drill, and the murderous close-order tactics it made possible, as a prime ingredient of European military superiority. His own experience in the Second World War is invoked in testimony to the psychological benefits of drill.

In contrast to such distinguished economic historians as J. U. Nef and W. W. Rostow, McNeill contends that war played a positive role in boosting the industrial revolution. Citing the experience of Britain in the period 1793-1815, he suggests that government war expenditures profoundly affected both the absolute volume of production and the mix of products from British factories and forges. He sees, for example, a direct link between the wartime impetus to iron production and Britain's postwar lead in the manufacturing of steam engines, railways and iron ships.

A brilliant section describes the development of arms firms as technological pioneers from the later nineteenth century. By 1914 public and private concerns in the armaments industry had become densely intertwined and it was easy to allege that capitalists' cynical pursuit of profit was the overriding consideration. McNeill shows, however, that the arms trade recruited many original

minds attracted primarily by the challenge of technical and business problems.

Although the two chapters devoted to the World Wars provide excellent concise accounts of the problems and consequences of mobilizing for total war on an unprecedented scale, there is a slight sense of falling away from the high level sustained for the coverage of the seventeenth to the early twentieth centuries. Indeed from the 1930s onwards the treatment becomes increasingly impressionistic, although this is a minor defect in the light of the distinction of the volume as a whole. There are also some speculative passages, such as the notion of population pressures as a main cause of modern war, which sit uneasily amid long technical descriptions of the development of weapons and warships.

The final chapter traces the evolution of increasingly destructive weapons systems since 1945 and suggests there is a risk from "internal decay" in the frustration of the armed forces' traditional values in an era of push-button war. McNeill sees the arms race continuing inexorably, fuelled by economic and scientific imperatives which were formerly such benevolent agents, until mankind annihilates itself. The only alternative lies in drastic political change to establish a global sovereign power with a monopoly of atomic weaponry. Alas, however, McNeill's "empire of the earth" sounds like a cure worse than the malady. How would it be arrived at except as the outcome of the very Great Power conflicts it is supposed to prevent; and why assume that the eventual victor would be more tolerant than, say, the Soviet Union today? The volume concludes with a two page appreciation of what the "millennium of upheaval" AD 1000-2000 will look like to historians a few hundred years hence, so perhaps Professor McNeill is an optimist after all.

This study, displaying extraordinary breadth of scholarship, certainly deserves a prominent place in university reading lists as one of the most comprehensive, incisive and stimulating histories of military power ever written.

Brian Bond

Brian Bond is reader in war studies at King's College, London.

Indus legacy

The Rise of Civilization in India and Pakistan
by Bridget Allchin and Raymond Allchin
Cambridge University Press, £25.00 and £8.95
ISBN 0 521 24244 4 and 28550 X

Allchin and Allchin published their admirable account of *The Birth of Indian Civilization* in 1968. Their new book, which ostensibly covers much the same ground, reflects the many recent developments in the archaeology of the Indian subcontinent, developments in which they have played an important role, a fact which lends additional authority to this new synthesis of the results of recent fieldwork and analysis.

Their theme is the growth of urban culture in the subcontinent, the Indian equivalent of the developments in the Nile Valley, Mesopotamia and the Yellow River valley; its relationship with the preceding prehistoric cultures, both palaeolithic and more recent; the impact of the Aryan invaders upon this urban structure; and finally the emergence of a new stage which underlies the whole pattern of present-day civilization in Bangladesh, India and Pakistan as well as in Sri Lanka.

The work is divided into three parts: Constituent elements; Indus urbanism; The legacy of the Indus civilization. The first part is concerned with the stone-using cultures which, particularly in the case of the older phases, are now being redefined to take into account recent geological research. Crude tools, mainly in quartzite, give way to more



Tithe-page to M. Drayton's *Poly-Olbion* (1612-22), illustrating the antiquarian fervour of the period. The central figure of Albion, flanked by historical figures evoking "Great Brittain's" past, is a young maiden holding a sceptre and a cornucopia and personifying Britannia wrapped in a "cartographic cloak" to symbolize the land. Taken from *English Map-Making 1500-1650: historical essays* edited by Sarah Tyacke, published by the British Library at £20.

sophisticated forms which, in the Middle Palaeolithic, show increasing diversity of techniques and types as well as regional variations.

Diversification and increasing adaptation to changing conditions continued through the Upper Palaeolithic, including changes in materials being worked and in hunting techniques. With the beginning of the Holocene (about 9000 BC) these developments led to a phase which, as the authors rightly note, her persisted to the present.

Environmental change was brought about by deliberate human intervention. Microlithic industries in association with hunting, fishing, pastoralism or simple agricultural cultures have been recorded throughout the subcontinent and Sri Lanka. Large factory sites, producing tools for trading over wide areas, point to the growth of cultural interchange. In the Indus Valley itself microlithic industries are found in what seem to be permanent settlements which represent early phases of the Indus urban civilization or of an immediately preceding stage.

The great cities of Mohenjodaro and Harappa emerge as the natural, almost inevitable successors to the Mesolithic cultures of the region. Nor does the sequence end there, for the famous present-day pilgrimage site of Pushkar south of the Thar Desert, with its traditional cattle fair, is surrounded by mesolithic sites comparable with centres of the Panjab and the Indus itself.

The section on Indus urbanism begins with an account of the way new patterns of settlement developed in the whole of the Indus system as long-range trade gave rise to substantial centres serving as entrepôts and growing into towns or even into what the authors describe as "caravan cities". A notable example is Mundigak, southern Afghanistan, the four main periods of which show, over a number of centuries, growth from a single settlement to a substantial town with great defensive walls, a palace and a temple complex. The latest stages of which are contemporary with the mature Harappan phase.

In the Indus drainage, countless sites show a growth from neolithic cultures, of a common type, to full Harappan urbanism. This mature culture is discussed with great clarity in two long sections which clearly show how strong are the links with preceding cultures. The nature of the Harappan town is discussed, together

with the characteristics of its architecture. Trade and agriculture receive proper attention, as befits key elements in the maintenance of urban cultures. There is also a long account of Harappan technology and the surprisingly few examples of Harappan sculptures as well as of the seals.

Part three, "The legacy of the Indus civilization", sets out to show first of all what happened in the Indus valley and the Punjab after Harappa and also in the Jamuna and the river systems of the tributaries, which run eastwards below the line of the Himalaya to flow into the Bay of Bengal to the east of Calcutta.

This is followed by a discussion of what happened in peninsular India. The link here is through the southern nuclear region to the south of the Thar Desert and which seems in fact very little influenced by Harappan culture, even though a site near Udaipur was clearly flourishing at the same time as mature Harappa. There are also links with the northern nuclear region between the Indus and the Doab, suggesting that there was a tradition strong enough to check the spread of Harappan culture to the south-east of the Indus system. What did occur outside the Indus region is subsumed in forty extremely detailed pages on the present state of our knowledge.

This is followed by a very well-balanced account of the arrival of the Indo-Aryan speakers, first detected perhaps in Swat about four millennia ago, and possibly at Kalibangan, about 200 kilometres south-east of Harappa, where an intrusive culture is found above a mature Harappan level. Whatever linguistic and religious benefits they brought, the Aryans seem to have put an end to urbanism and to writing, as the next inscriptions date from the time of Ashoka, mid-third century BC.

A. H. Christie

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Information Sources in the History of Science and Medicine, a guidebook to the field and its literature, has been edited by Pietro Corsi and Paul Weindling and published by Butterworth at £30.

BOOKS

CHEMISTRY

Practical technique

Education and Teaching in Analytical Chemistry
by G. E. Baitulescu, C. Patroescu and R. A. Chalmers
Ellis Horwood, Wiley, £16.50
ISBN 0 85312 384 5

In the 1950s many courses in chemistry in the British higher educational system contained a considerable amount of analytical chemistry, at least on the practical side. Practical courses in inorganic chemistry had large sections of quantitative analysis in the form of volumetric and gravimetric work; and qualitative analysis, either by use of group separation tables for inorganic cations and anions or by identification of functional groups followed by preparation of derivatives for melting point determination, was a feature of organic practical work.

Undoubtedly these practical courses, if carried through conscientiously, helped promote good practical technique and it is likely that although present courses have very different objectives - knowledge of reactions, of methods of preparation, solving problems of structure from physical methods - good practical technique is rarely one of the chosen objectives of the courses.

An understanding of the chemistry behind the analytical experiments was allegedly a fundamental point of the old courses, although some of the work could be carried out by rote learning. Qualitative analysis was generally popular with students who appreciated the detective work inherent in many of the separations and identifications.

The character of practical chemistry courses has changed markedly during the past 20 years, partly because of a desire to use practical work to illustrate more directly the lecture content of courses and partly because of a desire to conform with educational theorists who advocated teaching through research - at undergraduate level through projects. For various reasons the formal analytical content of courses as a whole has declined, so that recently in Britain and the United States trained analytical chemists have been in short supply and in considerable demand by industry. The Royal Society and the Science and Engineering Research Council have been concerned at the shortage of analytical chemists, although I am not clear as to whether there is a real shortage of chemists who can do analytical chemistry, particularly using modern physical chemical methods, or a shortage of analytical chemists. It seems, however, that in eastern Europe analytical chemistry is still in high regard.

This book contends that modern analytical chemistry is a unified and independent scientific discipline. The authors give their preferred method of achieving an education in analytical chemistry - rather surprisingly emphasizing acquisition of knowledge through lecture courses and paying rather scant attention to practical work and the acquisition of practical expertise. Project work as an educational medium is virtually unmentioned as is project motive as a reason for development of instrumentation.

It is not clear whether the authors advocate undergraduate courses which are wholly analytical chemistry (analytical chemistry is currently largely taught in masters courses at postgraduate level) and of course they do not say what should be omitted to make way for analytical chemistry. Unfortunately, the authors overstate their case in many respects - for example, by stating that the elemental and structural analysis of organic and inorganic compounds are part of analytical chemistry. The methods of structural analysis are part of physical chemistry and a mere knowledge of structure without

an understanding of the reason behind the structure and the importance of the structure would be of little use to any chemist.

The authors did not set out to provide a textbook of analytical chemistry. The detailed coverage of topics is necessarily arbitrary. For example, the quite comprehensive discussion of atomic absorption spectroscopy, anode stripping voltammetry, and various techniques for surface analysis contrasts with the scant attention paid to Fourier transform infrared spectroscopy and the implication that nuclear magnetic resonance spectroscopy is mainly of importance for the study of dynamic effects. The references given are generally to books or reviews and would thus be of considerable use as sources for further study.

In emphasizing the literature explosion, the book highlights the fact that many courses seem determined to cram in more and more material and to pay little attention to the future use to which students might put the information presented. Although chemists have been proud of the breadth of their subject while conserving detail, there has been all too little informal discussion about whether there should be specialization in say the final year of an undergraduate course or which of the following are of such fundamental importance that they must be taught in an undergraduate course: an understanding of the financial accounts of a chemical company, an appreciation of research strategy, the synthesis of terpenes, bonding in organometallic derivatives, or the methods of sampling Maritan dust.

This well-written and thought-provoking book deserves to be widely read. It contains more interesting quotations than I have ever seen in a scientific monograph. However, some of the authors are so different (Roumanian and Scotland), it does not seem to me to come near to providing an answer.

David Sharp

David Sharp is Ramsay Professor of Chemistry at the University of Glasgow.

Organic synthesis

Guidebook to Organic Synthesis
by Raymond K. Mackie and David M. Smith
Longman, £9.95
ISBN 0 582 45592 8
Organic Synthesis: the disconnection approach
by Stuart Warren
Wiley, £19.00 and £7.95
ISBN 0 471 10160 5 and 10161 3

The decision to divide chemistry into inorganic and organic branches originated in the belief that organic compounds had a necessary association with living plants and animals, a belief that remained unchallenged until urea was synthesized in 1828. Urea is a typical organic compound and its synthesis in the laboratory from inorganic starting materials is a classic experiment which not only disposed of the vital force theory but also led to the modern definition of organic chemistry. Organic chemistry is the chemistry of compounds of carbon, and many examples can be quoted which demonstrate the profound and beneficial influence of synthetic organic chemistry on our everyday lives.

More than one million organic compounds have been synthesized in the laboratory and many of these compounds are now produced industrially on a colossal scale. Such compounds include anaesthetics, oral contraceptives, plastics, polymers, synthetic fibres, paints, detergents, disinfectants, pharmaceuticals, agrochemicals, fertilizers, herbicides, insecticides, fungicides, food preservatives, vitamins, and dyestuffs. Furthermore, many known organic compounds represent new forms of matter which were first synthesized in the laboratory.

During the period 1850-1950, the

development of synthetic organic chemistry was based primarily on the chemistry of functional groups. However, since 1960, the subject has been transformed and now there is a completely different approach to the practice of organic synthesis. Functional groups are specific assemblies of particular atoms and the chemical behaviour of organic molecules is essentially determined by the types of functional groups which are present in their molecular structures. Thus, there are many different types of organic molecules containing oxygen atoms including alcohols, aldehydes, ketones, carboxylic acids, ethers, esters, lactones, peroxides, phenols, coumarins, and xanthenes. Each of these classes of organic compounds contains particular functional groups which essentially determine their chemical properties and the way in which they can be used as intermediates in organic synthesis. This approach forms the basis of Mackie and Smith's book.

After a survey of the main types of functional groups, a detailed presentation is made of the utilization of particular functional groups for the creation of carbon-carbon bonds and of carbon-oxygen, carbon-nitrogen, and carbon-sulphur bonds. Methods of organic synthesis are reviewed which involve reduction, oxidation, protecting groups, and modern organic reagents containing boron, phosphorus, and silicon. This monograph relies almost entirely on the traditional approach to organic synthesis based on the chemistry of functional groups. The description of the new approach to the synthesis of organic molecules involving retrosynthetic analysis and synthon recognition is rather superficial.

In contrast, Warren's book provides an instructive and stimulating account of the new methods which are now used by organic chemists to plan the synthesis of complex molecules. Retrosynthetic analysis and synthon recognition provide the foundation for a book which has all the characteristics of a scholarly work. Students and practitioners of organic chemistry will find the book valuable, because it is the first general account of the methods which should be used to plan organic syntheses in a logical and systematic fashion. The fact that organic chemistry is an experimental science is not overlooked and Warren emphasizes that planned syntheses are useful only when they have been tested by experiment in the laboratory.

The disconnection approach advocated by Warren is an intellectual exercise in which the constitutional formula of the target molecule is transformed by bond cleavage into smaller fragments (synthons) which eventually provide a basis for the selection of starting materials and reagents. Many of the strategies which are now used by research chemists for the synthesis of complex molecules have been generated by the disconnection approach. These methods are also amenable to computer treatment, and computer-assisted synthesis is now a useful tool in the examination of sequences of synthetic reactions designed to lead to target molecules.

This book is an excellent contribution to the chemical literature which conveys the spirit of excitement, challenge and adventure which motivates many organic chemists today.

W. D. Ollis

W. D. Ollis is professor of organic chemistry at the University of Sheffield.

A second edition of Alan J. Walton's *Three Phases of Matter*, originally published by McGraw-Hill in 1976, has been published with minor revisions by Oxford University Press at £25.00 and £10.95. The Press has also released a second edition in paperback only (£5.95) of W. Graham Richards and David L. Cooper's *Ab Initio Molecular Orbital Calculations for Chemists*.

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BOOKS

CHEMISTRY

Organic reactivity

Reactivity in Organic Chemistry by Gerhard W. Klumppp
Wiley, £39.10
ISBN 0 471 06285 5

Although this book is a translation of *Reaktivität in der Organischen Chemie* originally published in German in 1977, the author has managed to incorporate a significant amount of new material and to include work published up to 1980. The quality of translation is on the whole good, and the book is well produced with a large number of useful diagrams.

It is particularly concerned with providing an understanding of why a particular reaction pathway is followed, in order that the optimum conditions for carrying out a particular chemical transformation may be selected. It attempts to achieve this by analysis of a vast amount of experimental data, particularly material not at present treated in other texts. Unfortunately, the author has not been successful in his aim, as the book is more a physical organic chemistry text. As such, however, it presents a lot of interesting material (in the form of reaction schemes and tables).

Even so, the author has dealt with too much material without a sufficiently lucid discussion of its significance. For example, (and rather surprisingly in view of its relevance to the author's aim), the book mentions Baldwin's rules for ring closure with-

out explaining clearly the terms involved and with only one example. It is doubtful if a reader unfamiliar with this topic would learn anything from the limited discussion presented here. Similarly, in other areas, although a lot of material is presented, the level of discussion is generally poor; and the author frequently fails to define the terms and constants he has used, making it difficult for the book to be used without reference to the original literature (a particularly irritating feature for undergraduates).

The book is divided into three main sections on products, rates, and transition states. Section one details the nature of products obtained from competing reactions (for example, the elimination and substitution reactions of alkyl halides) and examines topics such as regioselectivity and stereoselectivity. This is followed by discussion of the importance of kinetic and thermodynamic control on the ratios of products formed in competing reactions. Section two, on the various relationships between reaction rates and the structures of substrates, provides useful discussions of the hard and soft acids and bases principle and the influence of solvents on reaction rates.

The final section, constituting half the book, discusses how the nature of the transition state can affect both the rate and course of a reaction and covers topics such as linear free energy relationships (also discussed in the section on rates), kinetic isotope effects, energy surfaces, and the position of transition states on the reaction co-ordinate. There is an extensive discussion of pericyclic reactions using the conservation of orbital symmetry, the frontier molecular orbital, and aromatic transition state approaches. Again, surprisingly in view of the author's stated aim there is no treatment of periselectivity and regioselectivity in cycloaddition reactions, taking into account the importance of the coefficients of the frontier molecular orbitals, or of the in-

fluence of Lewis acid catalysts on cycloadditions. As in many books on aspects of physical organic chemistry, the discussion of homolytic reactions is also rather weak. The author frequently reinforces his points by discussing a particular reaction (for example cycloadditions) in more than one section of the book; and the cross-referencing between the various sections is good.

An extensive bibliography makes the book a useful source of much valuable information not found in many other texts, and a good index enhances the utility of the book. Although it is on the whole too advanced for undergraduates, it would be a useful acquisition for libraries.

D. C. Nonhebel

D. C. Nonhebel is lecturer in chemistry at the University of Strathclyde.

Virtues of quantum mechanics

Molecular Quantum Mechanics (second edition) by P. W. Atkins

Oxford University Press, £29.50 and £13.95
ISBN 0 19 855 171 1 and 170 3

Solutions Manual for "Molecular Quantum Mechanics" by P. W. Atkins

Oxford University Press, £8.95
ISBN 0 19 855180 0

As the second edition of a popular textbook that first appeared in 1970, this book aims to present "an outline of the quantum mechanical principles that are fundamental to an understanding of the properties of molecules". It is thus appropriate for certain undergraduate courses in chemistry and physics, and also perhaps in some branches of engineering.

This new edition has all the advantages of the first: it is beautifully produced, clearly and attractively written, and contains a wealth of worked examples and problems for classroom use. Although it is about the same length as was the first edition, there are substantial changes in organization, and some smaller changes in content, justifying the author's claim that the book is more a total rewriting than a second edition.

Anyone who has taught a course on molecular quantum mechanics to physical scientists will know that many, perhaps even the majority, of the class will hate the subject. They will profess a complete inability to understand anything, or to do any of the set problems. They will justify their distaste in terms of the course's "lack of relevance" or on the basis of inability of yet this phenomenon only arises from the interaction between substances and light of a very restricted range of wavelengths. For the human eye this range is approximately 380-750 nanometres. However, the author of this book has not restricted himself to those natural pigments which are visible to man; he also includes some which are more significant for their absorption in the ultraviolet region. This decision is justified, not only on scientific grounds, in view of the biochemical relationship to colour, but also for their importance as pigments which are visible to some organisms such as insects.

The natural pigments have aroused the curiosity of scientists for well over a century and a half; and throughout history natural dyes and pigments have been used by man. Although most of the early efforts were more concerned with the structure of these pigments rather than their biochemistry, it did become possible with an adequate corpus of knowledge on structure to speculate on their origin. From these early studies there also developed the technique of chromatography, initially for the separation of pigments, but now used extensively for the separation of all compounds whether they are coloured or not. (Historically the term chromatography goes even further back in time when George Fields used it to describe the mixing of artists' pigments in his book of 1835).

With the discovery and isolation in the 1930s of isotopes of elements present in natural compounds, it became possible to prepare labelled compounds which could then be followed as they were metabolized by plants or animals. In terms of pigments one of the largest groups of compounds is the carotenoids, and

necessarily pedantic.

These problems may be illustrated fairly by considering the chapter on group theory, one that has changed quite considerably between the two editions. Although these changes have doubtless been made in the interests of greater accessibility for the material, they also mean that the distinction between the transformation properties of points and the transformation properties of functions, a distinction well and clearly made in the first edition, is practically lost here. For a student who goes on to use a book like Wigner or like Hamermesh (both of which are cited in the further reading section appended to this chapter), the distinction between these two kinds of transformation is one that is of the utmost importance. So, is the chapter really pointing the student in the right direction? On balance, perhaps it is not. On the other hand, a beginning student would probably find the chapter a very attractive introduction to the subject in context. And a student who went no further than this chapter would probably be left with the feeling that group theory was something that could be mastered. Has such a student had a confidence trick played on him? Well, yes and no.

This discussion typifies my feelings about the book as a whole. On the one hand, it is a fine book full of good things, attractively presented. On the other hand, when looked at more closely, not all the things are quite as easy as they are made to look. Is this a fault or a virtue? On balance, I would plump for it as a virtue. But one that, alas, I have never been able to acquire to inform my teaching, in the way that I imagine it informs Dr Atkins's.

Brian Sutcliffe

Brian Sutcliffe is reader in chemistry at the University of York.

Natural pigments

The Biochemistry of Natural Pigments by G. Britton
Cambridge University Press, £30.00
ISBN 0 521 24892 2

Life would be very dull in the absence of colour. Yet this phenomenon only arises from the interaction between substances and light of a very restricted range of wavelengths. For the human eye this range is approximately 380-750 nanometres. However, the author of this book has not restricted himself to those natural pigments which are visible to man; he also includes some which are more significant for their absorption in the ultraviolet region. This decision is justified, not only on scientific grounds, in view of the biochemical relationship to colour, but also for their importance as pigments which are visible to some organisms such as insects.

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the Liverpool school of biochemistry has played a major role in elucidating their biochemistry. Dr Britton, from Liverpool, has been actively involved in this work in recent years and is thus well placed to review the field.

After a brief survey of their structure and distribution in nature he considers the biosynthesis, function and applications of carotenoids (with a separate chapter on the role of vitamin A, which is derived from carotenoids, in vision). In general the function of carotenoids remains uncertain; and it is a philosophical point whether colour alone is a function - except possibly as an aid to the pollination of flowers, or as a warning, as camouflage, or for the recognition of other members of the species, especially of the other sex. Their role in photosynthesis and photoprotection in plants may also have parallels in the animal field.

Natural yellows and reds are usually derived from carotenoids except for those based on the flavonoid skeleton and related structures. This class is almost exclusively confined to plants and provides some of the most striking flower colours - dramatic effects which are usually due to anthocyanidins. Although flavonoids are widely distributed in plants, their presence - often not obvious to the human eye - can only be noted when examined in the ultraviolet region. This reflects their role as colour guides in flowers to aid insect pollination, as the insect eye is able to detect absorption in the ultraviolet. Without recognizing the biochemical reason gardeners too have used these patterns to develop new varieties whereby flavones have been changed, following a mutation, to anthocyanidins to make such patterns visible.

Among the red pigments, haemoglobin is perhaps the most significant. Essential to life for its role in oxygen transport, it is composed of the tetraphaenol prosthetic group, haem, which is also the source of its colour. Curiously the other major pigment essential to life is also a tetraphaenol: the green pigment chlorophyll which plays such a central role in photosynthesis.

The remaining pigments considered by Dr Britton form a rather heterogeneous group, including the essentially colourless quinones involved in electron transport, quinones such as alizarin which are only strongly coloured when used in mordant dyeing, and the intense colours of the extended quinones, the aphid pigments. Among the non-polymeric nitrogenous class of pigments, there are such miscellaneous examples as the betalains (for example, from beetroot) and the colourless natural source of the vat dye indigo. Also included are the polymeric melanins.

After chapters more concerned with functional aspects of pigments, Dr Britton concludes with a brief mention of those natural substances which bioluminesce, that is, produce light biochemically.

This book covers a wide range of topics encompassing many of the fundamental aspects of life. Designed for advanced undergraduate students or research workers in chemistry and biochemistry, it should be of interest to a wider audience, including physiologists, horticulturalists, medical workers, food scientists, and so on. For those wanting a good, up-to-date review of any topic in this field, this book is to be recommended.

G. P. Moss

G. P. Moss is lecturer in chemistry at Queen Mary College, London.

A collection of articles on the Preparation, Properties, and Industrial Applications of Organofluorine Compounds has been edited by R. E. Banks and published by Ellis Horwood (Wiley) at £32.50. The book completes a survey begun in *Organofluorine Chemicals and Their Industrial Applications*.

Revised editions of two widely acclaimed contributions to Oxford University Press's chemistry series have been published. A second edition of C. A. Coulson's *The Shape and Structure of Molecules*, revised by Roy McWeeny, is available at £10.95 and £4.95. A third edition of E. Brian Smith's *Basic Chemical Thermodynamics* is available at £9.50 and £4.50.

BOOKS

CHEMISTRY

Cherished phlogiston

The Formation of the German Chemical Community, 1720-1795 by Karl Hufbauer
University of California Press, £30.00 and £11.25
ISBN 0 520 04318 9 and 04415 0

In the history of science, no amount of paraded erudition can substitute for an ability to write engagingly and to address as wide a public as possible. Also to be avoided is the glib prose of a careless "popularizer" unsupported by sound analysis or documentation. So it is a special pleasure to read this important book which avoids both jargon and sloppiness.

It manages to combine an immense wealth of documentary data with a narrative of the most exceptional interest. The theme is the emergence during the eighteenth century of a group of chemists scattered through the various German states. By 1795 they had gained sufficient social cohesion to justify the title of a "chemical community", thus marking an important stage in the social history of chemistry and the chemical history of Germany.

However, one must not exaggerate. The maximum number of "miserable" chemists identified as belonging to this community is 65. Of the eight men who constituted its inner core it is doubtful if more than three were ever together at one time. And although the word "profession" slips in from time to time, nothing approaching the modern meaning of that term appeared until many decades later. How then could they fairly be termed a "chemical community"?

Hufbauer's answer to this question is to demonstrate the gradual increase in support for chemistry in moral, material and manpower terms. When L. Crell's *Chemisches Journal* appeared in 1778 it catalysed a new degree of coalescence in this community which could, in large measure, be identified from the subscription list and the printed communications of its members. The author's use of this material, together with other related data, constitutes one of the great merits of his book. Who the individual subscribers were, what they wrote, and how they responded to one another become clear for the first time. Their potted biographies and the histories of their institutions, with prolific documentation, furnish appendices which occupy half of the book. Even without the narrative this impressive collection of data will serve scholars for many years to come.

To those who like their history on the grand scale, with full-length portraits of great scientists, such endless attention to lesser men may seem to penetrate the fine structure of a scientific community and begin to understand how its activities relate to events and pressures in the world outside.

The author's analysis of the relation between the science actually done and the life of "his" community focuses upon the passionate debates on the cherished doctrine of phlogiston, then being assailed by the new oxygen theory of Lavoisier. He shows convincingly that social factors such as nationalism and the role of an individual within the community played an important part in theorizing about combustion, and even in the interpretation of experiments.

Unfortunately, he does not explain how one set of chemists could actually miss the evolution of oxygen from heated mercuric oxide whereas their rivals found no such difficulty. A social interpretation of science has much to commend it but it does have limits and one would dearly like to know how, in chemical terms, such a conflict could be sustained.

On a few other minor points one could express some disagreement. Can one, for example, associate oxygen chemistry with approval of the



Lorenz Crell, founder of the first successful chemical journal. Taken from *The Formation of the German Chemical Community, 1720-1795* by Karl Hufbauer.

French Revolution, if at least one of its proponents took a distinctly low view of events in Paris, and its founder was a victim of the guillotine? The bibliographies, while invaluable, do not seem to draw upon the *Biographie Universelle* of Michand. And table 19 seems to have lost its notes. However, these are minor blemishes in a work of great importance for present and future historians of science and an object lesson in effective communication.

Colin Russell

Colin Russell is professor of the history of science and technology at the Open University.

Crystalline state

Crystallography by Ralph Steadman
Van Nostrand Reinhold, £3.95
ISBN 0 442 30498 6

Ralph Steadman's short monograph is another attempt to find an interesting and novel method for introducing students to what is probably the most exciting, yet surely the most fundamental, corner of crystallography. Although mathematical techniques are only really efficient ways of codifying most crystallographic properties, and provide the most powerful tools for defining effects and discovering new relationships, it is the most fortunate of students that can accept and handle these techniques without reference to some pictorial representations.

Sequences of illustrations have been carefully organized to lead the attentive reader into a flexible and intuitive understanding of each topic. In effect, the author is trying to provide in 120 pages the practical experience, the comfortable familiarity with the topics, that might otherwise be obtained by many months of working in a research laboratory. He has succeeded in providing the initial stages of approach to the initial stages of performing measurements in experiments which he knows merely to be examples.

This pictorial approach works very well, at least in those sections dealing with structures, lattices, planes and directions. The informal presentation (unfortunately including unjustified text) has produced an easily readable book, very few parts of which require much careful reasoning or concentrated attention. The host

of questions are so easily answered that the reader is likely to be swept along into trying most of them, thus broadening his perspective on the topics. The reader who is prepared to deface illustrations might also like to add a few construction lines, which could serve to clarify or emphasize points.

Because this book is largely intended to teach by discovery, the text is kept to a minimum, and serves to initiate trains of thought. There are occasions when perhaps a little more explanation would be useful. For example, in the section on "directions in a lattice", the identification of the direction [110] is explained, and the direction [010] is illustrated; but no mention is made of the relationship between [010] and [020] until several pages later.

The opening section of the book, on "structures and lattices", works hard to help the student understand that a lattice is a concept, while the real thing is a structure. In section two, on "planes and directions", the page discussing directions in a hexagonal lattice, Weber indices (though marked "not important: it can be skipped"), could have been omitted altogether, or made more explicit. Although section three on "relations between planes and directions" will benefit from the author's explicitly written out the cofactors of a matrix on one page, but assumes the reader can evaluate a determinant on another. Section four, on "atomic coordinates", expands the foundations laid in section one.

It is in section five, on "X-ray powder photographs", that the student will benefit from the stylized treatment of experimental results, although at some stage he should see a real photograph, and realize that in the laboratory all is not as clear as in the illustrations. Section six on "the reciprocal lattice", manages to convey some of the simplicity and elegance of the Ewald construction. The presentation is simple and uncomplicated, and the reader is likely to have grasped the principle before he realizes that many generations of students have found the concept of the reciprocal lattice complex and rather unnecessary. Section seven, on "electron diffraction", is perhaps the least satisfactory part of the book, probably because it can only begin to touch on a very large topic. Even so, it will provide a useful introduction to more detailed texts.

Though not a work of reference, this book is a useful and well-presented introduction to its subject.

D. J. Watkin

D. J. Watkin is lecturer in chemical crystallography at the University of Oxford.

Basic skills

Fundamentals of Preparative Organic Chemistry by R. Keesee, R. K. Müller and T. P. Toube
Ellis Horwood: Wiley, £15.00 and £6.50
ISBN 0 85312 396 9 and 450 7
Introduction to Organic Chemistry by Hugh J. Williams
Wiley, £12.75 and £5.40
ISBN 0 471 10206 7 and 10207 5

The contents of *Fundamentals of Preparative Organic Chemistry* came as a pleasant surprise, as this short book's English title does it less than full justice. I would have preferred *Basic Operations in Preparative Organic Chemistry*, as this would have been more faithful to the Swiss original (*Grundoperationen*) and much more informative. I would also have added a sub-title, *A Guide for Beginners in Research*.

The book offers practical advice to the student on all the important aspects of research work. There are chapters dealing with manipulative skills like distillation, crystallization, chromatography, extraction, the use of an inert atmosphere, and solvent purification. Other chapters deal with safety (including waste disposal and the handling of radioisotopes), and with literature searching, report-writing, and laboratory notebooks. The chapter on spectroscopy deals only with interpretation and not with experimental procedure.

Much wisdom and common sense is contained in these chapters, and the book should be on every research student's reading list. A good research supervisor, of course, ought to teach his students personally about all these matters, but those less fortunate in their choice of supervisor will find the book indispensable.

I wish I could be equally enthusiastic about *Introduction to Organic Chemistry*. If I were to offer a subtitle for this volume, it would have to be *Yet Another Introduction*, as there must have been at least two dozen similar books published during the past 20 years or so, and there is not much to choose among them. It follows, of course, that any newcomer in this highly competitive market must offer something novel (or at least different) in content or presentation if it is to displace established titles from recommended lists.

When I saw that this book had

African origins (Professor Williams works in Sierra Leone), I had high hopes that something novel was about to emerge, especially since the publisher emphasizes the particular relevance of some of the chapters for African students. However, these expectations were short-lived. Both content and approach are traditional; indeed, I found myself wondering more than once, if this was really an old manuscript to which odd bits and pieces had been added to keep it up to date. Certainly I could not find much in it that might not also have appeared in a similar book dated 1962, and I find it almost inconceivable that a textbook of the eighties should make no mention at all of spectroscopy (which, after all, has revolutionized the practice of organic chemistry during the past 25 years), and should pay so little attention to conformation (cyclohexane is not even discussed).

What the book does contain is more or less predictable. The first two parts deal with structural, physical, and theoretical matters, and the third part (which constitutes more than half of the total) is concerned with functional group reactions and the properties of simple aromatic systems. These parts are, in general, well presented, although there are occasional blunders of chemistry which could mislead an inexperienced student - for example, the conversion of a carboxylic acid into an acyl halide is described as a nucleophilic substitution of OH⁻ by Cl⁻; and a spurious distinction is made between nucleophilic and electrophilic acyl substitution. The final part of the book contains a short account of stereochemistry, and two very strange chapters: "selected synthetic techniques", a rag-bag of odds and ends which ought to have been incorporated in part three and "naturally occurring products of Africa and their uses", which contains nothing more exotic than petrochemicals, carbohydrates, fats and oils, and some miscellaneous plant products. (It also contains the classic "howler" that α - and β -glucose are enantiomers.) I cannot recommend the book.

David Smith

David Smith is lecturer in chemistry at the University of St Andrews.

A second edition of D. R. F. West's *Ternary Equilibrium Diagrams* has been published by Chapman & Hall at £13.00 and £5.95. Problems have been provided, with outline solutions and answers, and a substantial new chapter extends the coverage of actual systems.

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Robin K Harris, *Professor of Chemistry, University of East Anglia*

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BOOKS

CHEMISTRY

Fluids, pure and mixed

Properties of Liquids and Solutions by J. N. Murrell and E. A. Boucher. Wiley, £19.75 and £8.90. ISBN 0 471 10201 6 and 10202 4

Liquids and Liquid Mixtures (third edition) by J. S. Rowlinson and F. L. Swinton. Butterworth, £20.00 and £15.00. ISBN 0 408 24192 6 and 24193 4

Similar titles can as here hide great differences in aim. Murrell and Boucher's book is pitched at any undergraduate reading chemistry, not as peripheral reading but as a central part of his study. Rowlinson and Swinton's book is a new edition of a definitive classic for the postgraduate specialist.

Murrell and Boucher defend their subject as a "core course".

Most chemical synthesis is carried out in the liquid state because reactions are on the one hand faster than in the solid state and on the other hand energetically cheaper and mechanistically simpler than in the gaseous state. Most methods of purification involve either a distribution of solutes between immiscible solvents or the partition of mixtures in solid-liquid or liquid-liquid equilibria. Most biochemical and many environmental systems are in the liquid state or involve colloids or membrane boundaries. Solid-liquid equilibria are particularly important for the industrial preparation and purification of materials.

Rather less convincingly they defend the need for their book:

Most of the material we present can be found either in general physical chemistry texts or in monographs. However, the former generally lack the detail that is required for a course at honours degree level and the latter lack the cohesion that comes from teaching the subject as a whole and are often too advanced in their speciality.

Comparison with modern undergraduate textbooks of physical chemistry by Berry, Rice and Ross (Wiley, 1980), by Atkins (Oxford University Press, 1982), and by Moore (Longman, 1972) suggests that nearly all the material has already been covered. Nevertheless, the story is nicely told again here.

It is a pity, however, that the authors' casual style is sometimes marred by dogmatically made but ill-thought-out or erroneous statements. For example, after explaining that two or more phases at equilibrium must have a common temperature and pressure, they add that "finally there is a criterion arising from the second law of thermodynamics that the entropy of the system be a maximum". If that were true at specified temperature and pressure then two phases of a pure substance could be at equilibrium only in the presence of a vanishingly small amount of the low-temperature (and therefore low-entropy) phase. However, later on they do get the "final" criterion right, but will by then have left their inexperienced readers confused: the phases must have common chemical potentials.

As they also claim that "systems which are liquid at room temperature and atmospheric pressure normally have critical pressures above 100 atm", I looked up the meaning of "atm" and assured myself that critical pressures are almost always between 30 and 50 atm. Perhaps, however, Murrell and Boucher are so conditioned to thinking of pressures in terms of SI pascals (Pa) that they mistakenly try to "speak down" by the use of old-fashioned non-SI units.

These infelicities, and many more,

will need correction in a second edition. That edition also warrants a sketch, at least, of the curious phase equilibria of fluid mixtures at high pressures, a subject still hardly mentioned in any elementary textbook on physical chemistry. In a world where fluid mixtures are increasingly pumped from one place to another under pressures of 5 to 10 MPa or more, such phase behaviour should undoubtedly be taught within elementary physical chemistry.

Rowlinson and Swinton, on the other hand, delve deeply into this very topic, though hardly in an elementary manner. In the third edition of a book first written by Professor Rowlinson in 1959.

Since then the field has grown enormously, and the book has managed to keep pace with that growth. Among the subjects dealt with cursorily at most in 1959 and only a little more deeply in 1969 but now reflecting large increases of knowledge are at one extreme the critical state both for pure substances and for mixtures, statistically-based theories of fluids and of fluid mixtures and especially perturbation methods of coping with departures from centrality of molecular interactions, and the methods and ("experimental") results of computer simulations. At the other extreme is the vast increase in our knowledge of thermodynamic mixing functions of all kinds of pairs of substances, a few of them interesting but most of them boring. One wonders whether the great advances in accuracy and the ease with which we can measure mixing quantities, especially by dilatometry and by calorimetry, have not led to a great waste of time and effort. If that be true then the authors must share most of the responsibility with myself, a few Antipodeans, and a Californian or two!

Max McGlashan

Professor McGlashan is head of the department of chemistry at University College London.

Industrial cobalt

Cobalt and Its Alloys by W. Betteridge. Ellis Horwood, Wiley, £16.50. ISBN 0 85312 451 5

Each volume in this new series on industrially important metals is intended to follow a similar pattern. It includes a summary of the chemical, physical and mechanical properties of the metal and chapters covering extraction, alloying, production processes and applications, together with elucidation of the economic factors involved. It is essential, therefore, that the authors should be able to bring both academic and industrial expertise to bear on their subject-matter.

Although cobalt is not used in large quantities, its importance lies in the critical nature of its applications, the lack of adequate substitutes and the concentration of its sources in politically volatile areas of the world. After a condensed summary of the principal physical, chemical and mechanical properties of elemental cobalt in chapter one, the nature and location of sources and of the processes of chemical extraction are detailed in chapter two.

These chapters are followed by a discussion of the alloying behaviour of cobalt and its phase diagrams. Although the complications produced by the allotropic transformation are discussed, these do not account for the laws governing phase equilibria displayed by a number of the phase diagrams illustrating this chapter.

Consideration of phase equilibria leads logically to a discussion of industrial alloys, their heat treatment, fabrication and applications in chapters four to seven and in chapter nine. In all cases Dr Betteridge very clearly relates material to properties and applications whether it be high temperature alloys, magnetic materials, cemented carbides or high strength steels. The brief reference list at the end of each chapter should enable the reader to follow up points of detail, although in some cases the sources cited are a little dated.

Chapter eight on electrodeposition separates discussion of cobalt-based materials for special applications (for example, in controlled expansion alloys) from the main body of the text on industrial materials, and is followed by two short chapters on the applications of cobalt compounds and the relevant economics. The latter makes salutary reading reminding the reader more of how dependent the economies of the industrialized western world are on the politics of the developing countries.

This book admirably fulfils its function as a compact and readable source book on cobalt for metallurgists and engineers.

Harvey Flower

Harvey Flower is lecturer in the department of metallurgy and materials science at Imperial College, London.

Fischer's reaction

The Fischer Indole Synthesis by Herman Robinson. Wiley, £95.00. ISBN 0 471 10009 9

The Fischer indole synthesis is a most useful reaction in organic chemistry whereby an arylhydrazine is converted, by reordering of atoms, into an indole. Application of this reaction allows the preparation of a wide variety of different indole derivatives from the corresponding hydrazones which are themselves the more readily synthesized from simpler molecules. The utility of this synthesis lies in the fact that a large number of varied organic molecules of biological importance, which are produced by living things, contain within themselves an indole nucleus. Their synthesis may well involve application of the reaction discovered by Hermann Emil Fischer.

Born in 1852 near Cologne, Fischer's career as a research chemist was a brilliant one. At the turn of the last century he stood pre-eminent among organic chemists and today he is regarded as one of the very greatest of all organic chemists. His research work was characteristically bold and elegant, involving pioneering contributions to the chemistry and synthesis of purines, proteins and sugars. The award to Fischer of the Nobel prize for chemistry in 1902 recognized his pioneering work on sugars and purines.

Fischer's research on sugars and the synthesis of indoles have a common beginning in 1874, when he was an assistant in organic chemistry at the University of Strasbourg. A student in a laboratory class was like so many students of organic chemistry, obtaining only intractable "muddy" products from a reaction. Fischer repeated the reaction, with modification, and obtained a solid compound which turned out to be the salt of an arylhydrazine. Subsequently he reduced diazotized aniline and obtained phenylhydrazine. After further experiments with arylhydrazines, he found that they would react with aldehydes and ketones to give hydrazones. In 1883 Fischer and one of his students reported the conversion of an arylhydrazine into an indole using acid catalysis. Subsequent experiments (which still continue) have established the wide applicability and versatility of the reaction.

It is very fitting in this century of the first publication on the Fischer indole synthesis that it should be the subject of a comprehensive up-to-date survey. Dr Robinson has managed a mammoth task with meticulous attention to detail. His monograph to the synthesis stands at 923 pages, over 2,000 chemical formulae and nearly 3,000 references to original papers. As so much valuable and detailed information is now so readily at hand, it is clear that this is a highly comprehensive book which will be indispensable to those engaged in the synthesis of indoles and related compounds. It is not intended, however, for those who want a brief account or overview of the Fischer indole synthesis and related reactions.

After a short biography Robinson discusses the discovery of Fischer's synthesis, its early development, and related reactions. Chapter two provides a historical account of the studies leading up to the formulation of the currently accepted general mechanism for the reaction. The remaining chapters take up in very great detail the application of the reaction to a myriad of cases, its extension into other syntheses (oxindoles, 2-aminobenzothiazoles, benzofurans and pyrroles), its limitations, exceptions, and alternative indolization reactions. Several extensive and very useful tables are included.

Robinson's account is well written, the formulae are clear, the index is good, and the text is free of error. One irritating feature is the use of names in the text for references to the original research literature, instead of numbers. This, together with the inevitable use of a single structural formula together with "R" groups to cover several compounds, at times makes the text difficult to read.



Hermann Emil Fischer

concentrates on the chemical aspects of glass, once glass formation, phase transformation and the physical properties of glasses have been introduced. The narrow definition of the term "glass" is taken to include only inorganic materials. This includes all common glasses from window glass, through Pyrex to glasses used to encapsulate radioactive wastes, excluding, however, the growing range of organic glasses. Although a valid argument for this exclusion lies in the quite different properties of these glasses, some coverage might have widened the usefulness of the book.

Professor Paul asserts in the preface that the rapid advance of the subject will make imminent revision of his book essential, seemingly regarding the present work as an interim measure. However, if advances are being made at the speed suggested, I would have hoped for a more modern flavour. Indeed, of the references at the end of each chapter only a limited number were published in the past ten years, and many of these are by Professor Paul and his group. One topic that could have been incorporated to bring the book up to date is a detailed discussion of the interaction of radiation with glasses, the source of some interesting chemistry. And as much research is being directed towards the encapsulation of radioactive waste in glass as a method of disposal, the subject is also very topical.

A problem encountered in all works of a specialized nature, but which touch on other associated fields, is how far to digress into peripheral subject areas. For example, a large part of the chapter on colour and pigments is taken up with theories of chemical bonding in transition-metal complexes. Once a discussion of chemical bonding has been embarked on, molecular orbital theory follows and by the time glasses are dealt with an advanced spectroscopy course has been given. Although this may be necessary for some readers, those to whom this is quite novel would not be able to glean sufficient information from the cursory summary given here. And others would already be familiar with the material.

Although this is an excellent textbook for the University of Sheffield's degree course in glass technology, it occasionally falls short as a comprehensive guide for a wider scientific readership (the index in particular is inadequate). However, it is still a text to put above its rivals in the field.

D. B. Hibbert
D. B. Hibbert is lecturer in physical chemistry at Royal Holloway and Bedford Colleges, University of London.

As the title implies, the book con-

centrates on the chemical aspects of glass, once glass formation, phase transformation and the physical properties of glasses have been introduced. The narrow definition of the term "glass" is taken to include only inorganic materials. This includes all common glasses from window glass, through Pyrex to glasses used to encapsulate radioactive wastes, excluding, however, the growing range of organic glasses. Although a valid argument for this exclusion lies in the quite different properties of these glasses, some coverage might have widened the usefulness of the book.

Professor Paul asserts in the preface that the rapid advance of the subject will make imminent revision of his book essential, seemingly regarding the present work as an interim measure. However, if advances are being made at the speed suggested, I would have hoped for a more modern flavour. Indeed, of the references at the end of each chapter only a limited number were published in the past ten years, and many of these are by Professor Paul and his group. One topic that could have been incorporated to bring the book up to date is a detailed discussion of the interaction of radiation with glasses, the source of some interesting chemistry. And as much research is being directed towards the encapsulation of radioactive waste in glass as a method of disposal, the subject is also very topical.

A problem encountered in all works of a specialized nature, but which touch on other associated fields, is how far to digress into peripheral subject areas. For example, a large part of the chapter on colour and pigments is taken up with theories of chemical bonding in transition-metal complexes. Once a discussion of chemical bonding has been embarked on, molecular orbital theory follows and by the time glasses are dealt with an advanced spectroscopy course has been given. Although this may be necessary for some readers, those to whom this is quite novel would not be able to glean sufficient information from the cursory summary given here. And others would already be familiar with the material.

Although this is an excellent textbook for the University of Sheffield's degree course in glass technology, it occasionally falls short as a comprehensive guide for a wider scientific readership (the index in particular is inadequate). However, it is still a text to put above its rivals in the field.

D. B. Hibbert
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NOTICE BOARD

Appointments

General
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Readings: Dr A. J. Kennedy (French); Dr J. A.

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The following have been appointed titular professors: Dr J. B. Cowan (Savannah history); Dr D. I. Graham (neuropathology); Dr S. M. Keane (accountancy); Dr C. J. Larner (sociology); Dr M. C. MacLennan (political economy); Dr T. A. Norton (biology); Dr R. S. Phillips (zoology); Dr R. P. Singh (political economy); Dr P. G. Toner (pathology - Royal Infirmary); Dr J. D. Zisoulis (systemic theology).

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Appointments

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Universities

University of Bristol

"NEW BLOOD" LECTURESHIPS

Applications are invited for the following LECTURESHIPS (tenable from 1st August, 1983, with the possibility of extension to 1984) to encourage the appointment of younger members of the academic staff. Applicants should normally be under the age of 35 years. Although the posts will carry teaching duties, their primary role is to contribute substantially to research.

LECTURESHIP IN MOLECULAR GENETICS

Lecturers in the four following posts will also become members of a new Molecular Genetics Unit set up by the University from resources from four departments.

BIOCHEMISTRY (ref. TLJ)

Applications are invited for two lectureships. For one of these, preference will be given to those whose research interests lie in the area of eukaryotic gene structure and function, or in a related area of cell biology. For the other, research experience in a wider area of cell biology will also be considered.

BOTANY: Lectureship in Molecular Genetics (ref. EB)

The applicant should have experience in the field of plant or microbial molecular genetics. It is hoped that the successful candidate will participate in one of the relevant research areas in the Department: plant molecular genetics, microbial heavy metal resistance, or mycology.

PATHOLOGY: Lectureship in Molecular Pathology (ref. TLJ)

Applications are invited from scientists with experience in molecular genetics whose research interests lie in the field of molecular pathology, cell gene expression. It is hoped that the successful applicant will participate in one of the relevant research areas in the Department: plant molecular genetics, microbial heavy metal resistance, or mycology.

INORGANIC CHEMISTRY (ref. EB)

The appointment will be in the area of organometallic chemistry, with special interest in the use of organometallic compounds in catalysis. Some experience in X-ray diffraction methods would be advantageous.

ORGANIC CHEMISTRY (Organic Geochemistry Unit) (ref. EB)

The appointment will be in the area of organic geochemistry. Experience in one or more of the following areas would be advantageous: petroleum research, environmental geochemistry, and the use of isotopes in geochemistry.

PHYSICAL CHEMISTRY (ref. EB)

An appointment to be made in the area of physical chemistry with emphasis on physical chemistry, electrostatic processes, and photochemical and atmospheric phenomena.

PHYSICS (ref. EB)

The position will be for a Lecturer in the area of Nuclear Physics. Preference will be given to applicants with research interests in the field of nuclear physics, particularly in the areas of nuclear structure, nuclear reactions, and nuclear astrophysics.

AERONAUTICAL ENGINEERING: Aircraft Systems and Control Engineering (ref. JPB)

Investigation and implementation of appropriate control laws for flight at extreme boundaries of the flight envelope, to take advantage of current advances in aerodynamics, control systems, and active control technology and structures (e.g. fly-by-wire systems).

The aim is to develop a more manoeuvrable and efficient aircraft in such extreme conditions, and to develop a more efficient and reliable aircraft in such conditions, and to develop a more efficient and reliable aircraft in such conditions.

CIVIL ENGINEERING: Structural Dynamics (ref. JPB)

A strong research project is required to assign a small number of research students to work on the dynamics of structures. The particular current research programme is concerned with the dynamics of structures, and the dynamics of structures, and the dynamics of structures.

VETERINARY MEDICINE: Lectureship in Veterinary Virology (ref. JF)

Applications are invited from scientists with postgraduate research experience in the area of virology. The successful applicant will be expected to develop a research programme in the area of virology, and to develop a research programme in the area of virology.

POLITICAL AND ECONOMIC HISTORY (ref. EB)

The successful applicant will be expected to engage in research in some aspect of the economic and political history of the United Kingdom, and to develop a research programme in the area of economic and political history.

UNIVERSITY OF NEWCASTLE UPON TYNE

"NEW BLOOD" LECTURESHIPS

Applications are invited for the following six lectureships funded under the U.G.C. "New Blood" scheme. Applicants should normally be under 35 years of age. The posts are available from 1st October, 1983.

Architecture - Energy in buildings (Post Ref. 1)

The appointee will join a small, multi-disciplinary team whose current research interest is in the efficient use of energy in buildings. A background in engineering, mathematics or physics would be desirable, with substantial computing experience. Ideally in the field of simulation studies. A knowledge of Building/Architecture would be an advantage, but is not an essential requirement.

Civil Engineering - Hydraulic Engineering (Post Ref. 2)

Preference will be given to Civil Engineering graduates with special interest in hydraulic engineering, particularly in groundwater resources development, and/or in turbulence and momentum transfer in open channel flow.

Dermatology - Skin Biochemistry (Post Ref. 3)

The field of work will be molecular biochemical mechanisms underlying the action of hormones in the skin and the variation in expression of the effects of different hormones on skin cells. The post is suitable for a scientist trained in the techniques of molecular biology and the successful candidate will be expected to set up and run an independent laboratory as well as working in collaboration with skin physiologists in the department.

Geography - Human Geography (Post Ref. 4)

The appointment will be in the Department of Geography but associated with the Centre for Urban and Regional Development Studies, an S.S.R.C. designated Research Centre, which is attached to the Department. The successful candidate will be expected to develop research on the impact of developments in information technology; this should be relevant to the programme of work on urban and regional change being undertaken in the Centre. Candidates should outline previous research experience and suggest possible future work in the specified area.

Geology - Economic Geology (Post Ref. 5)

The appointment will be made in the field of economic geology, with special reference to the relationship between the geology of the region and the evolution of carbonaceous matter within the sedimentary record. Experience in petrology, geochemistry and sedimentology would be relevant.

Virology - (Post Ref. 6)

The vacancy is for a PhD, or equivalent, with experience of the techniques of nucleic acid analysis to complement existing work on the virus associated with infantile diarrhoea and respiratory syncytial virus. The successful candidate will be expected to develop a research programme in the area of virology, and to develop a research programme in the area of virology.

UNIVERSITY COLLEGE LONDON

"NEW BLOOD" AND INFORMATION TECHNOLOGY LECTURESHIPS

Applications are invited for the following appointments funded under the U.G.C. "new blood" and information technology initiatives. The posts are available from 1st October, 1983 and for the "new blood" posts candidates should normally be aged 35 or under.

"New Blood" Lectureships

Anatomy & Embryology - field of Developmental Biology. Experience in the field of differentiation would be particularly welcome but candidates with interests in other areas will be considered. (Ref: NB1)

Chemical & Biochemical Engineering - in the area of particle technology. A chemical engineer or other suitably qualified graduate with research interest and experience involving processing particulate material. (Ref: NB2)

German - Department pays particular attention to inter-relationship of literature and history and seeks candidate with excellent knowledge of German language and literature able to contribute expertise in German social and cultural history since the Reformation. (Ref: NB3)

Mathematics - Fluid Mechanics, preferably with computational methods. (Ref: NB4)

Offshore Engineering - The London Centre for Marine Technology at University College London has interests which include structural integrity and structural dynamics. Candidates with an interest in these or related areas are invited to apply. Post in Mechanical Engineering Department. (Ref: NB5)

Paediatrics - Prevention of brain damage in Neonates. For research on the early detection of cerebral hypoxia and ischaemia in the newborn infant using non-invasive techniques including nuclear magnetic resonance spectroscopy and near infra-red absorption spectroscopy. (Ref: NB6)

Physics & Astronomy - (1) In the field of position physics. The successful candidate will be encouraged to work on the development of an intense low energy positron beam initially to be used for the study of atomic collision processes involving positrons. (Ref: NB7)

(2) In the area of space astronomy. The successful candidate will be encouraged to utilise space-borne equipment to acquire and analyse data in one or more of the following fields: (i) infra-red astronomy, (ii) ultra-violet astronomy, (iii) X-ray astronomy. The choice of field will be determined by considerations including the interests of the candidate and priority developments in the astronomical community. (Ref: NB8)

Statistics - with special reference to the evaluation of statistical procedures. Candidates should preferably have a strong background in statistics and be able to apply statistical methods to a wide range of problems. (Ref: NB9)

Textology - Laboratory is situated in the Department of Clinical Pharmacology and has links with both clinical and basic science departments. Candidates should have an interest in biochemical mechanisms of cell injury in model systems and in patients. Experience in analytical techniques (HPLC and GC) would be an advantage. The post will involve teaching in both undergraduate and postgraduate Technology courses, and some time is likely to be spent in research in the Government and industrial laboratories. (Ref: NB10)

Information Technology - (CAD/Graphic) - a new MSc course joint with Electronic Engineering has been approved. Candidates should have experience in one or more of computer aided design of VLSI, graphics, software engineering or systems software. (Ref: NB11)

Electronics - To contribute to an IT Conversion Course run jointly with Computer Science; research interests and, if possible, experience in integrated circuit design; a candidate who is bilingual in Hindi/Urdu would be particularly welcome. (Ref: NB12)

Salary for all posts will be in the Lecturer Scale £8,375-£12,505 per annum plus £1,158 per annum London Allowance.

Applications (no forms) to Assistant Secretary (Personnel), University College London, Bower Street, London WC1E 6BT from whom further particulars may be obtained. Closing date for receipt of applications 20th May 1983. Please quote appropriate reference number in all correspondence.

University of Exeter

Appointment of Vice-Chancellor

The Chancellor of the University of Exeter, Sir Rex Richards FRSE, wishes it to be known that a Joint Committee of Council and Senate seeks a successor to the Vice-Chancellor, Dr. Harry Key CBE, who will retire on or before 30 September 1984.

Would those interested in the particulars of the appointment or wishing to recommend someone for consideration please write in confidence to Sir Rex Richards, c/o Academic Registrar, and Secretary, University of Exeter, EX4 4JQ, before the end of May.

Universities continued

UNIVERSITY OF NEWCASTLE UPON TYNE

INFORMATION TECHNOLOGY LECTURESHIPS

Applications are invited for three Lectureships funded by the U.G.C. to support research and teaching in the field of Information Technology.

Two appointments will be made in the Computing Laboratory (Refs. 7 and 8) and one in the Department of Electrical and Electronic Engineering (Ref. 9). Work in the two departments is closely interrelated, particularly in the research areas indicated. The posts are available from 1st October 1983.

Candidates will be expected to be suitably qualified and to have had postgraduate experience, in industry or in a university, which is relevant to research in one or more of the following areas of interest:

Post A (Ref. 7)
Advanced Computer Architectures - parallel architectures and the exploitation of VLSI circuits.

Post B (Ref. 8)
Development of techniques and tools for formal specification and verification of hardware and software systems; and/or Development of computer-based tools to aid the use of stochastic and allied modelling techniques.

Post C (Ref. 9)
VLSI Design Verification - formal proofs of correctness and design for testability.

Salary will be on the Lecturers' scale: £8,375-£12,505 per annum (under review), according to age, qualifications and experience.

Further particulars, quoting the post reference, may be obtained from the Deputy Registrar (F.P.), The University, Newcastle upon Tyne NE1 7RU. Applications (3 copies), giving the names and addresses of three referees, should be received not later than 31st May 1983.

BRUNEL UNIVERSITY

"New Blood" and Information Technology Lectureships

Applications are invited for the following Lectureships available from 1 October 1983 under the UGC's New Blood Scheme. The roles of these appointments will be to contribute substantially to research and to do some teaching in the areas indicated.

New Blood Lecturer in Mathematics (Numerical Analysis)

The successful candidate will be in the Department of Mathematics and Statistics should have research interests in the numerical solution of partial differential equations, particularly nonlinear equations, and their application in continuum mechanics.

New Blood Lecturer in Non-Metallic Materials (Plastics composite processing technology)

Applicants for this post in the Department of Non-Metallic Materials should have previous research experience in the microstructure characterisation or the processing of thermoplastic composites.

Information Technology Lecturer in Electrical Engineering and Electronics (VLSI Design)

Applicants should have experience in the design of digital systems, preferably Computer Aided. A knowledge of expert systems and ideas for applications of such in design would be welcome.

In accordance with UGC guidelines, the age limit for "new blood" appointments is 35, but in exceptional cases an appointment of a particularly well-qualified candidate over this limit may be made. Salaries will be on the Lecturer scale £8,375-£12,505 per annum (under review), but it is not likely that an initial salary of more than £11,105 per annum will be offered for new blood posts according to age, qualifications and experience. A London Allowance of £1,158 per annum is also payable. Applicants are required to contribute to the University's Superannuation Scheme.

Application form and further details from the Personnel Secretary, Brunel University, Uxbridge, Middlesex, UB8 3PH, or telephone Uxbridge 37108 extension 48. Closing date: 27 May 1983.

THE UNIVERSITY COLLEGE OF WALES ABERYSTWYTH

"NEW BLOOD" APPOINTMENTS

DEPARTMENT OF BOTANY AND MICROBIOLOGY

Applications are invited for the following lectureships funded under the UGC's "New Blood" scheme. The posts are available from 1st October, 1983. In accordance with the terms of the "New Blood" scheme, candidates should normally be aged 35 or under, and in the early years their primary role will be to contribute substantially to research.

MICROBIAL PHYSIOLOGY

With particular reference to the physiology of anaerobic bacteria. Interests in the physiology of related areas would be particularly welcome. Bacteriologists and microbiologists with research interests in other aspects will also be considered.

PLANT PHYSIOLOGY

With particular reference to plant growth substances. Interest in whole plant aspects would be particularly welcome. Candidates with interests in other areas will also be considered.

Salary for both posts will be on the Lecturer scale £8,375-£12,505 per annum. Applications (no forms) to the Assistant Secretary (Personnel), University College of Wales, Aberystwyth, Aberystwyth, Ceredigion, SY23 3DA, Closing date for applications 18th May 1983.

UNIVERSITY OF STRATHCLYDE

Applications are invited for a SENIOR RESEARCH FELLOWSHIP tenable in the DEPARTMENT OF OPERATIONAL RESEARCH and funded by the SOUTH OF SCOTLAND ELECTRICITY BOARD.

Appointments will be for a period of three years. Candidates should be graduates in Operational Research or in an allied discipline and have experience in the application of Operational Research in industry. They should also be capable of and committed to the resolution of problems in the management of a large scale enterprise.

This is an opportunity to contribute to the application of Operational Research in a large autonomous power undertaking which employs 13,000 staff engaged in generation, transmission and distribution of electricity to 1.5m consumers over an area of 8,400 square miles in South Scotland with a turnover of £700m.

The successful applicant will be expected to:

- i) work in conjunction with the Operational Research group in the Board and with Senior Management;
- ii) supervise the work of postgraduate students assigned to projects in SSB and undertake some teaching duties at the University;
- iii) assist in developing Operational Research within SSB.

The main effort of the Senior Research Fellow will be directed towards the development of financial and corporate planning systems. He will be expected to make a major contribution to the ongoing implementation of an advanced computer-based financial planning model.

The Board has considerable computing facilities including a dual ICL 2872 mainframe. An ICL PERQ graphics workstation has recently been acquired to host the financial planning model and the Senior Research Fellow will be expected to make extensive use of this facility.

Salary within range £11,105-£15,240 per annum (Research Range II/III), with initial placing according to age, qualifications and experience. USS superannuation benefit.

Applications (two copies) including full curriculum vitae and names and addresses of three referees, and quoting reference R10/83 should be lodged by 23 May 1983 with Academic Staff Office, University of Strathclyde, MacCauley Building, 16 Richmond Street, Glasgow G1 1XQ from where further particulars may be obtained.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL (University of London)

"NEW BLOOD" LECTURESHIPS

Applications are invited for the following appointments which have been established under the national scheme for encouraging the appointment of young members of staff. Normally, applicants should be not more than 35 years old.

Human Physiology Biomedical Engineering (Ref. NB 1)
The post will be in the Physiology Department under Professor J G Widdicombe. The successful applicant will be required, in close collaboration with clinical departments, to investigate and develop the application of new methods for invasive and non-invasive measurement and manipulation of physiological parameters, with emphasis on innovations in methods of detection, interfacing with data recordings and storage systems and delivery of physiologically-active substances (e.g. hormones and drugs).

Biochemical Neuropathology (Ref. NB 2)
This post will be in the Pharmacology Department under Professor J S Kelly. The successful applicant will continue our development of new methods for the study of changes in drug receptor density with the necessary biochemical and molecular skills are not required.

Both appointments carry the salary scale £8,375-£12,505 and London Allowance £1,158 p.a. Further particulars available from the Establishment Officer, St. George's Hospital Medical School, Cranmer Terrace, London, SW17 0RE. To whom applications should be sent to arrive by the 6th June. Prospective applicants may telephone Professor Widdicombe (01-672 1265 Extension 4881) about post NB 1 or Professor Kelly (01-672 1265 Extension 4722) about post NB 2.

UNIVERSITY OF STRATHCLYDE

Department of Marketing

Bilston Ltd

Marketing Teaching Company

VACANCIES FOR TEACHING ASSOCIATES IN MARKETING

Applications are invited from suitably qualified graduates for two-year fixed term appointments, to work as a Teaching Company in Marketing set up by the Department of Marketing of the University of Strathclyde, the Scottish Development Agency, and Bilston Ltd.

The persons appointed will be based in Bilston at Bilston Ltd and will work on company based projects in the areas of sales forecasting and industrial market research. Part of the associate's time will also be spent in Glasgow in the University of Strathclyde where opportunity will be given to register for a higher degree. The appointments will be subject to a period of probation and will be renewable on the basis of satisfactory performance.

Applicants should have a good honours degree and/or postgraduate qualification in Marketing, Business Studies, Management Science or related subjects. Ideally with some computer-aided or statistical forecasting systems would be desirable. For the second, experience in industrial market research or knowledge of organizational buying behavior would be an advantage.

The appointments will be for two years in the first instance with a starting date as soon as possible. The likely pay range is £2,500 per annum and will be on the Bilston and Academic Scale. Salary Scale Band 1 (£5,411-£11,105) per annum with appointment at a level consistent with age and experience.

Further particulars (quote reference R11/83) may be obtained from the Academic Staff Office, MacCauley Building, 16 Richmond Street, Glasgow, G1 1XQ. Closing date: 20 May 1983.

UNIVERSITY OF STRATHCLYDE

CHAIR IN BIOLOGY

The University invites applications for the new post of Professor in Biology, with special interests in Cell or Molecular Biology, in the Department of Biochemistry and Biophysics.

Further particulars (Ref. 26/83) may be obtained from the Registrar, University of Strathclyde, MacCauley Building, 16 Richmond Street, Glasgow G1 1XQ to whom applications should be sent by 31st May 1983.



DEPARTMENT OF POLITICS

Applications are invited for a one-year post of Temporary Lecturer in the Department of Politics. Candidates should have expertise in the field of Political Philosophy; ability to help with teaching in other areas of political study will be an advantage. Salary scale £8,375 x £430 (18) to £13,605 per annum (under review).

The initial salary will depend on qualifications and experience. Further particulars may be obtained from D. A. S. Copland, The University, Southampton SO9 5NH to whom applications (7 copies from UK candidates) should be sent not later than 30th May, 1983 quoting reference number 180/ATHE.



COMPUTER STUDIES

(Re-advertisement)

Applications are invited for the post of LECTURER in Computer Studies. The person appointed will contribute to a growing undergraduate teaching programme and will strengthen research activity in the general field of Software Engineering. Candidates should have an Honours degree in Mathematics, Science or Engineering and either a higher degree in Computer Science or appropriate industrial experience.

The ideal candidate will have extensive relevant experience and an established track record in research. Being realistic, we recognise that such a combination is rare, and we are prepared to settle for less. In particular, applications from young researchers of demonstrable promise will be welcomed.

The post is tenable from 1 September, 1983. Salary scale £8,375 x £420 (16) - £13,605 per annum; initial salary will depend on qualifications and experience.

Further particulars may be obtained from Mrs E. C. P. Beers, Staffing Department, The University, Southampton SO9 5NH, to whom applications (7 copies from UK applicants) should be sent not later than 5 May, 1983, quoting reference 183A. Previous applicants need not re-apply.

UNIVERSITY OF STIRLING

"NEW BLOOD" APPOINTMENTS

Applications are invited for the following lectureships, whose primary role in the early years will be to conduct research:

1. PSYCHOLOGY - Cognitive Neuropsychology. Applicants should have substantial research experience in experimental psychology and clinical neuropsychology. Experience in computing would be an advantage.
2. CHEMISTRY - Inorganic Chemistry. Applicants should have substantial research experience in inorganic chemistry and/or bioinorganic chemistry. Although preference may be given to those with interests in analytical chemistry and/or bioinorganic chemistry.
3. INSTITUTE OF AQUACULTURE - Fish Genetics. Applicants should have substantial research experience in fish genetics and be trained and experienced in modern techniques of genetic manipulation.

Salary will be on the Lecturer scale £8,375 to £13,605, depending on age and experience. Further particulars may be obtained from the Secretary, University of Stirling, Stirling FK9 4LA; Tel: 3171, Ext. 2314, to whom applications together with the names of two referees should be sent before 31st May, 1983.

UNIVERSITY OF READING

Department of Physics

'New Blood' Appointment in POLYMER PHYSICS

Applications for a Lectureship in the Department of Physics are invited from candidates with relevant experience in Physics, Physical Chemistry or Materials Science. The Lectureship involves research in Polymers Physics and some contribution to the teaching activity of the Department.

The person appointed will be expected to complement the existing research on the structure of polymers by initiating research into their electrical and optical properties. The appointment is from 1st October, 1983 on the scale £8,375 to £13,605 p.a.

Further particulars and application forms are available from the Personnel Officer, University of Reading, Whiteknights, Reading RG6 2AA, quoting Ref. AC 598. Closing date 27th May, 1983.

University of Kent at Canterbury

LECTURER IN COMPUTER SCIENCE

Applications are invited for a Lectureship in Computer Science. The successful candidate will be expected to contribute to the teaching and research in the Department of Computer Science. The appointment is from 1st October, 1983 on the scale £8,375 to £13,605 p.a.

Further particulars and application forms are available from the Personnel Officer, University of Kent at Canterbury, Canterbury, Kent, CT2 7NF, quoting Ref. AC 598. Closing date 27th May, 1983.

University College Cardiff

Department of Civil & Structural Engineering

LECTURER IN CIVIL ENGINEERING

Applications

Polytechnics continued

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

LECTURER GRADE II/ SENIOR LECTURER IN ELECTRICAL AND ELECTRONIC ENGINEERING

Applicants should preferably have some expertise in the field of Linear Electronics, or Communications Engineering, or Computer Engineering.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

PRINCIPAL LECTURER IN COMPUTER APPLICATIONS TO MANUFACTURING SYSTEMS

Applicants are invited from highly qualified and experienced production, industrial or computer systems engineers who can contribute specialist expertise to teaching and research in one or more of the following disciplines: simulation of manufacturing systems, facility design, production scheduling, industrial engineering, computer-aided manufacturing or robotics.

LECTURER GRADE II/ SENIOR LECTURER IN COMPUTER APPLICATIONS TO MANUFACTURING SYSTEMS

Applications are invited from good honours graduates in industrial or production engineering with at least three years relevant industrial experience. The post will involve teaching and research in one or more of the disciplines listed above. An interest in pursuing research is essential.

Salary Scales: Principal Lecturer £11,931-£15,018 Lecturer II/Senior Lecturer £8,855-£12,816

Further details and form of application from the Staff Officer, Trent Polytechnic, Burton Street, Nottingham. Closing date 13 May 1983.

TRENT POLYTECHNIC
NOTTINGHAM

Brighton Polytechnic

Department of Electrical and Electronic Engineering Information Technology Initiative

Senior Lecturers Lecturer Grade II/Senior Lecturers (4 POSTS)

Applications are invited from well qualified persons with recent industrial/teaching/research experience in one or more of the following areas: digital electronics; data communications; microprocessor applications; remote instrumentation technology. The posts arise from the replacement of staff and from a Government initiative intended to expand the provision for information technology.

Successful candidates will have the ability/potential to teach at honours degree level and above. A higher degree and/or interests in research/development activities is desirable but not essential.

The Department has currently over 300 students on honours degree courses and expects, within the near future, to offer a new honours degree, also a postgraduate course within the microelectronics/information technology area. Established and expanding research facilities are available which have a strong emphasis towards industrial collaboration.

Salary: Lecturer II £8,855-£11,022 Senior Lecturer £10,173-£12,816

Further details and application forms are obtainable from the Deputy Head of Personnel, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT. Tel: Brighton 693866, Ext. 2837. Closing date 17 May 1983.

SHEFFIELD CITY POLYTECHNIC HEAD OF DEPARTMENT OF HEALTH STUDIES

Applications are invited for the above post which will become vacant on 1st September, 1983. The Department is well established and offers a wide range of professional undergraduate and postgraduate courses in health care provision and health related studies together with significant and increasing interests in research.

Applicants must have appropriate qualifications, academic and professional experience and the necessary personal qualities to lead a large and active staff team in one of the leading departments of health studies.

The ability and desire to maintain close links with practitioners and the professional bodies is essential.

Salary: Burnham HOD Grade VI which is currently £15,867-£17,490.

Application forms and further details are available from the Personnel Officer (Depl THES), Sheffield City Polytechnic, Hallford House, Fitzalan Square, Sheffield S1 2BB or by telephoning 0742-209111, Ext. 387. Completed forms should be returned by no later than 17th May, 1983.

Sheffield City Polytechnic is an Equal Opportunities Employer

THE CITY POLYTECHNIC OF HONG KONG

The Hong Kong Government has appointed a Committee to plan the establishment of a second polytechnic in Hong Kong. To be named the City Polytechnic of Hong Kong, the institution will have an initial target of the equivalent of 8,000 full-time students by the early 1990s and a planned capacity for an ultimate population of 13,500. The Polytechnic expects to be able to enrol its first students in autumn 1984.

It is intended that the study programmes should be developed on a modular structure with a strong vocational flavour. The majority of courses will be at professional and higher technician levels, and a substantial number will be day-release and evening courses. There will also be degree programmes although the number of students on such programmes will not exceed 30% of the total student population.

The Planning Committee has appointed Prof. David J. Johns, Senior Pro-Vice-Chancellor of Loughborough University of Technology as the founding Director of the new Polytechnic and he will be taking up the appointment in October 1983. Meanwhile applications are invited for the following posts tenable immediately:

AT ASSOCIATE DIRECTOR LEVEL

Associate Director (Academic Planning)
To be responsible to the Director for detailed planning in the following areas: academic structure; course structure; academic validation and monitoring procedures; academic regulations; assessments and examinations; academic awards and student admissions. The appointee will also be expected to assume responsibility for the co-ordination of the preparation of academic development proposals and will be responsible for the implementation of the modular course structure.

Associate Director (Resource Planning)
To be responsible to the Director for detailed planning in the following areas: staffing requirements at all levels; space and building requirements and allocations; equipment and other resource allocations. The appointee will be expected to identify resource requirements and to prepare the resources estimates to support the planned academic developments. In addition the appointee will be expected to assume responsibility for the implementation of the annual allocation of resources throughout the institution.

Secretary to Council & Chief Administrative Officer
To be responsible to the Director for the co-ordination of all administrative functions and for the efficient discharge of secretarial functions to the Council and such other committees of the Council as may be required.

AT HEAD OF DEPARTMENT LEVEL

Heads of the following initial teaching departments:
Accountancy
Business Studies
Computing Studies
Languages
Mathematical Studies
Social Work

It is intended that a modular course structure will be adopted by the City Polytechnic and that departments will be grouped into Schools of Study. Heads of Departments would be expected to develop courses in their respective departments as part of the overall modular structure and also to function additionally as Chairmen of their School of Study from time-to-time.

Academic Secretary
To be responsible for the development and operation of all functions relating to academic administration. The appointee will be expected to establish a proper framework of administrative arrangements in keeping with planned academic developments.

Estates Officer
To be responsible for the development and operation of the Estates Office which will be responsible for all aspects of physical development and maintenance of all buildings, related plant and equipment coming within the purview of the Council.

Finance Officer
To be responsible for all matters relating to the financial management function of the administration. The appointee will be expected to ensure that the financial management system is in keeping with planned academic developments.

General Secretary
To be responsible for the development and operation of the personnel and general management functions of the Polytechnic administration and other secretarial functions relating to the governing Council. The appointee will be expected to ensure that the personnel management system is in keeping with planned academic developments.

Librarian
To be responsible for the development and operation of a library that will be commensurate with the requirements dictated by planned academic developments with norms adopted by the Department of Education & Science in the U.K.

Management Information Officer
To be responsible for the development and operation of a Management Information Unit. The function of the Unit will be to collect information from a variety of sources on all aspects of Polytechnic activity, to rationalise methods of data presentation and, as an end-product to supply such data as may be required for planning purposes.

The Heads of Administrative Departments will be expected to work in conjunction with the Associate Director (Academic Planning) and the Associate Director (Resource Planning) to ensure that the administrative systems provide a proper framework for planned academic developments.

Salaries (currently under review):
Associate Directors: HK\$27,450.00 per month (£30,857 p.a.)
Heads of Department: within a range but not less than HK\$22,000.00 per month (£24,955 p.a.)
(Sterling equivalents as at 18th April, 1983)

Terms and Conditions of Service
The initial appointment will be made on fixed-term contract of four years, at the end of which a gratuity equal to 25% of salary earned over the whole contract period will be payable. Benefits include long leave (approximately 3 months after every 21 months duty); heavily subsidized housing; medical and dental benefits and where appropriate children's education allowances and leave passages.

Applications
Application forms and job specifications are obtainable from the Association of Commonwealth Universities (ACU), John Soane House, 36 Abchurch Lane, London EC4N 3DF. Completed forms should reach the Secretary to the Planning Committee, P.O. Box 98441, Tsim Sha Tsui Post Office, Hong Kong, by Friday, 20th May, 1983. Two additional copies should also be lodged with the Association of Commonwealth Universities.

Interview of United Kingdom candidates on the preliminary shortlist will take place in London during the week beginning 13th June; candidates on the final shortlist will be invited to Hong Kong for interview during the week beginning 11th July, 1983.

Strathclyde Department of Education

GLASGOW COLLEGE of TECHNOLOGY

LECTURER 'A' IN CHEMISTRY

The person appointed will be a specialist in inorganic or Physical Chemistry and will be required to teach this branch of Chemistry. Applicants should possess an honours degree in Chemistry or an equivalent qualification. Relevant industrial experience and a research interest, particularly in an aspect of materials analysis or corrosion science would be added recommendations.

LECTURER 'A' IN PSYCHOLOGY

The Department wishes to appoint a well qualified and experienced Lecturer to teach on undergraduate honours degree courses and professional courses. The person appointed would be required to contribute to at least 2 of the following areas: DEVELOPMENTAL PSYCHOLOGY, SOCIAL PSYCHOLOGY, INDUSTRIAL/OCCUPATIONAL PSYCHOLOGY and PSYCHOLOGY FOR PROFESSIONAL NURSES.

Salary Scale (both posts) - £7,956-£11,700 - (bar) £12,861.

Application forms from the Personnel Officer, Glasgow College of Technology, Cowcaddens Road, Glasgow G4 0BA. Tel: 041-824 7070, to whom applications should be returned within 14 days of the appearance of this advertisement.

URGIT

ROBERT GORDON'S INSTITUTE OF TECHNOLOGY, ABERDEEN SCHOOL OF LIBRARIANSHIP

LECTURER

Applications are invited from fully-qualified Librarians of Graduate status for the above position. The successful applicant will join the Bibliographic and Reference Studies team, and expertise in Information Technology will be an additional advantage.

Salary range £7,956-£12,561 per annum (under review).

Assistance with removal expenses.

Details from Secretary, Robert Gordon's Institute of Technology, Schoolhill, Aberdeen AB9 1FR. (0224 638111).

KINGSTON POLYTECHNIC School of Teacher Education & Music

Applications are invited for the following appointments in Teacher Training, from September 1983:

SENIOR LECTURER/LECTURER II IN MATHEMATICS (Primary)

This is a full-time permanent appointment for which recent primary school teaching experience and a good qualification in mathematics will be important. An ability to contribute to one or more other aspects of Teacher Training would be useful.

LECTURER II IN PRIMARY SCHOOL STUDIES

This is a temporary appointment for one year, which might suit a teacher on secondment from school. Particular requirements include an ability to lecture on the school curriculum. Recent primary school teaching experience is important, as is the ability to contribute to the teaching of one or more subjects in the curriculum.

Salary scales: Lecturer II £7,404-£11,571 Senior Lecturer £10,722-£13,355

(Both include London allowance)
Application forms and further details from Academic Registry, Dept AO, Kingston Polytechnic, Penrhyn Road, Kingston upon Thames KT1 2EE. Tel: 01-849 1366. Closing date 13 May 1983.

DUNDEE COLLEGE OF TECHNOLOGY (Re-advertisement)

Applications are invited for the post of

COLLEGE SECRETARY

The college - a Scottish Central Institution - offers a wide range of degree and diploma courses. The person appointed will be directly responsible to the Principal for the administrative, financial and legal affairs of the college and he/she will also act as Secretary to the Board of Governors and the Academic Council.

Applicants should have appropriate graduate and/or professional qualifications together with substantial administrative experience at a responsible level, preferably in higher education.

The salary is presently £17,847 (which reflects an upgrading since the previous advertisement) and a cost of living award, with retrospective effect from 1 April 1983, is currently under negotiation. Financial assistance towards the cost of removal expenses may be payable. Further particulars and application forms are available from the Principal, Dundee College of Technology, Bell Street, Dundee DD1 1RE, to whom completed applications should be returned by 16 May 1983.

Polytechnics continued

HUMBERSIDE POLYTECHNIC Department of Computer Studies & Mathematics SENIOR LECTURER/LECTURER II COMPUTING/INFORMATION SYSTEMS

Post Term Contract - 2 years Ref: ACA476
The principal degree and diploma courses within the department involve major studies of applications of computers in business, industry and public authorities. Applicants should have appropriate practical experience of computer-based information systems in areas such as applications/systems programming and systems design/analysis. A good honours degree and/or MBCS is essential. Staff are expected to undertake activities including research, in addition to teaching duties. Salary: £10,173-£14,844 (bar) £12,816
LI £8,855-£11,022
Application forms (to be returned by 13th May 1983) and further details may be obtained from the Personnel Officer, The Polytechnic, Queensgate, Hull HU1 3DH. Tel: (0484) 22388 ext 224.

PLYMOUTH POLYTECHNIC

PLYMOUTH BUSINESS SCHOOL Lecturer II In Marketing (1 YEAR POST)

SALARY: £8,855-£11,022 (PAY AWARD PENDING)

Applications are invited for the above post tenable for one year commencing 1st September 1983, from applicants with appropriate academic qualifications and industrial experience.

The successful candidate will be expected to teach on a variety of courses in Marketing and Business Policy across the Polytechnic.

Applicants should be able to teach marketing research will be especially welcome.

Application form to be returned by 24th May 1983 can be obtained with further particulars from the Personnel Officer, Plymouth Polytechnic, Drake Circus, Plymouth PL4 8AA.

Salary scale (under review) £11,022-£13,355

Details and application forms available from the Personnel Officer, Plymouth Polytechnic, Drake Circus, Plymouth PL4 8AA.

Closing date: 20th May 1983.

Further details and application forms available from the Personnel Officer, Plymouth Polytechnic, Drake Circus, Plymouth PL4 8AA.

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Further details and application forms available from the Personnel Officer, Plymouth Polytechnic, Drake Circus

Nene College Northampton

SENIOR LECTURER**PRIMARY PROFESSIONAL STUDIES LEADER**

Applications are invited from suitably qualified people for the above post, commencing 1st September, 1983.

The successful applicant will be responsible for the Development of Primary Professional and Curriculum Studies in the College including leading a new primary curriculum unit in the B.Ed. degree.

LECTURER II/SENIOR LECTURER**IN READING AND LANGUAGE DEVELOPMENT**

Applications are invited from suitably qualified people for the above post, commencing 1st September, 1983.

The successful applicant will be expected to offer specialist contribution in this key curriculum area, leading and co-ordinating work in a unit of the B.Ed. degree and in appropriate in-service courses.

For further details and application form for the above posts, send s.a.e. to the Dean, School of Education and Social Science, Nene College, Moulton Park, Northampton NN2 7AD.

Completed application forms should be returned by 11th May, 1983.

**THE BRITISH SCHOOL OF OSTEOPATHY
COURSE CO-ORDINATOR**

A vacancy exists for a Course Co-ordinator for the 4-year full time Diploma Course. The appointment would preferably be full time, on a 3-4 year engagement initially, and presents an opportunity for a person with experience of running degree-level courses. A science or health-care background would be desirable, but not essential.

The post would be particularly suitable for someone who has taken early retirement. Salary (full time) in the Senior/Principal Lecturer range. The School is a private establishment with charitable status. Please apply with an outline of your experience, to the Principal, from whom further details may be obtained.

Sir Norman Lindop,
The Principal,
The British School of Osteopathy,
174 Suffolk Street,
London, SW1V 4HG.
Tel: 01-930 9254.

**Cambridgeshire
College of Arts and
Technology
TEMPORARY
LECTURER I IN
ENGLISH**

Required for one year (from 1st September 1983) to deliver a range of courses in English literature, and will be responsible for the development of the English Department. The successful candidate will be expected to have a minimum of 3 years' experience in the Department. An outline of your experience, to the Principal, from whom further details may be obtained.

Salary scale £5,355-£9,567 (under review) depending on qualifications and experience.

Details and forms from Head of Department or Lecturer in English, Cambridgeshire College of Arts and Technology, 174 Suffolk Street, London, SW1V 4HG. Tel: 01-930 9254.

**Chester College of
Higher Education**

The following Lecturers are required from 1st September 1983 to deliver a range of courses leading to BA (Hons) and B.Sc. (Hons) degrees of the University of Liverpool.

**LECTURER IN
HISTORY**

To help with a course in History, and to offer advice and support to students in the Department.

**LECTURER II IN
PSYCHOLOGY**

To help with courses in General Psychology and Applied Psychology, and to offer advice and support to students in the Department.

**LECTURER II IN
RELIGIOUS
STUDIES**

Applications should be sent to the Principal, Chester College of Higher Education, Chester, CH1 3BQ, by 11th May, 1983.

Salary scale £5,355-£9,567 (under review) depending on qualifications and experience.

Details and forms from Head of Department or Lecturer in English, Cambridgeshire College of Arts and Technology, 174 Suffolk Street, London, SW1V 4HG. Tel: 01-930 9254.

Completed application forms should be returned by 11th May, 1983.

**Luton College of
Higher Education
Department of Business
Studies and Public
Administration
LECTURER I -
INFORMATION IN
TECHNOLOGY IN
BUSINESS STUDIES**

Applications are invited for this new appointment to strengthen the team responsible for developing a suitable IT, Information Environment in the Department. An outline of your experience, to the Principal, from whom further details may be obtained.

Salary scale £5,355-£9,567 (under review) depending on qualifications and experience.

Details and forms from Head of Department or Lecturer in English, Cambridgeshire College of Arts and Technology, 174 Suffolk Street, London, SW1V 4HG. Tel: 01-930 9254.

Completed application forms should be returned by 11th May, 1983.

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Completed application forms should be returned by 11th May, 1983.

Salary scale £5,355-£9,567 (under review) depending on qualifications and experience.

**BEDFORD COLLEGE OF HIGHER EDUCATION
Lecturer II
in Computer Science**

Do you have experience in:
Operating Systems?
Micro-Computers?
Basic, Pascal, Fortran?
Assembler?

An opportunity has arisen for an additional appointment to a team teaching a wide range of initial and advanced courses to meet the needs of young and adult students, and of local industry and commerce.

Applicants should have substantial applied computing experience and a degree or equivalent qualifications. Further details from The Director, Bedford College of Higher Education, Cauldwell Street, Bedford MK42 9AF. Tel: 0234 46151.

Adult Education**North Yorkshire
County Council****Askham Bryan College
of Agriculture &
Horticulture**

Askham Bryan, York, YO2 2JH.

**LECTURERS/SENIOR
LECTURERS**

Applications are invited for the following appointments:

1. Horticulture Lecturer (Full-time) in the Horticulture Department, Askham Bryan College, York, YO2 2JH.

2. Horticulture Lecturer (Part-time) in the Horticulture Department, Askham Bryan College, York, YO2 2JH.

3. Horticulture Lecturer (Part-time) in the Horticulture Department, Askham Bryan College, York, YO2 2JH.

4. Horticulture Lecturer (Part-time) in the Horticulture Department, Askham Bryan College, York, YO2 2JH.

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39. Horticulture Lecturer (Part-time) in the Horticulture Department, Askham Bryan College, York, YO2 2JH.

Adult Education**London Borough of
Ealing****Education Department
AREA ADULT
EDUCATION
PRINCIPAL**

Burnham, Ealing, London W5 2JH.

Applications are invited for the following appointments:

1. Adult Education Principal (Full-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

2. Adult Education Principal (Part-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

3. Adult Education Principal (Part-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

4. Adult Education Principal (Part-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

5. Adult Education Principal (Part-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

6. Adult Education Principal (Part-time) in the Adult Education Department, London Borough of Ealing, London W5 2JH.

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BIRKBECK COLLEGE
(University of London)
SOCIAL SCIENCE STUDENTSHIPS AT BIRKBECK
The Social Science Research Council has allocated the following studentships for research and advanced courses for offer to candidates nominated by Birkbeck College.

Linked Research Studentships
Despatch theory and validation. (Professor R. Portes, Economics)
Economics of military expenditure. (Dr R. P. Smith, Economics)
Representation in object perception. (Dr G. W. Humphreys, Psychology)
Long-term changes in nutrition, welfare and productivity in Britain. (Professor R. C. Ploud, Economic and Social History)
Socio-economic and demographic changes in the South-east Region using the population census. (Professor D. W. Thind, Geography)

Advanced Course Studentships
New awards are available for the M.Sc. Economics course.

For further information and application forms for admission to the College apply immediately to the Registrar, Birkbeck College, Malet Street, London, WC1E 7HX.

THIRD WORLD FOUNDATION**wishes to appoint
EDITORIAL RESEARCH
ASSISTANT**

to carry out assessment and evaluation of information and manuscripts on Third World issues, with particular reference to South Asian region. Research and analysis of political and social developments in Pakistan. Specialist knowledge particularly of contemporary political affairs of Pakistan is a necessary prerequisite. Excellent ability to evaluate information and to communicate both in writing and orally is essential. Fluency in Urdu and Punjabi and regional languages of Pakistan also required. Outstanding academic qualifications and research background required for the job. PhD or equivalent in Social Sciences from a reputable institution in Britain will be preferred.

Age: 28/35
Salary attractive.

Please write in the first instance with full C.V. to:

Third World Foundation for Social & Economic Studies
New Zealand House
80, Haymarket
London SW1Y 4TS

Further particulars from the Departmental Assistant, Department of Sociology, University of Essex, Colchester, CO4 3SQ.

Applications are invited for a "new history" lecturer in the Department of Art History, University of Essex, Colchester, CO4 3SQ.

Candidates should have a PhD in Art History, and a minimum of 3 years' experience in the field. The successful candidate will be expected to promote studies and pursue research in the field of the history of art and architecture.

Salary at appropriate level, dependent on experience. Applications should be sent to the Departmental Assistant, Department of Art History, University of Essex, Colchester, CO4 3SQ.

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Don's diary

Glimpse of a rare trip into the 'real' world

The new blood running stale in my veins, spring coming on, no job and none in prospect — the time has surely come for a conference. "It's the only way," insists a friend. "Meet people, make an impression, a bit of crawling in the right quarters." Not a week in Salamanca, I'm afraid, but a day in S... situated somewhere well to the north of Watford.

I can't overnight: finance and other commitments prevent it. So it's up at five, a mile's cycle through the drizzle, and Inter-City. A pleasant journey, I almost feel a sense of purpose, perusing the day's agenda and marshalling my wayward thoughts. The train arrives on time, and a taxi is conveniently on hand.

9.50: The University of S... plate glass and graffiti. I bump into my fellow conferees head on, in a bunch, in a corridor. They seem happy and at ease. My relief at seeing that at least one other person on the guest list has no university to his name is short lived. On receiving his badge he is mightily offended, and insists that the girl writes his affiliation on the cardboard in felt-tip before he will pin it to his jumper. We are all early, but eventually start late.

10.46: The tape recorder is finally set in motion by the only person prepared to admit any knowledge of machines (ours is what may be termed a *recherché* arts discipline), and the machine responds by emitting a hideous high-pitched shriek.

10.50: The sermon, delivered by a bigish name in High Church style. Only one difficult moment, when he spills his water, and then pulls the lectern off the table trying to regain his poise. Applause. No comment from the floor allowed.

11.20: The fun begins. After what was billed as a debate between two old warhorses, neither of whom seemed particularly convinced by his own arguments or aware of his opponent's, comments are invited from the floor. The slow wheeling spoons of the tape machine hiss on to the accompaniment of a series of special pleas, generally devastating in their irrelevance. Every now and then some obvious, well-established fact or opinion is announced with the excitement and conviction of a new discovery. So the discussion lurches on, some voices are lost in the welter, and I begin to feel hot, confused, and in need of a piss. Thankfully, others share my feelings, at least on the last issue, and there is a short break. The gents in the University of S... are peculiar, having only a single closet, but three wash basins. Do they do these things differently in the north? I am tempted, but stay in the queue.

12.20: Changes must be made to the agenda. There is no time for this before lunch, and that would be inappropriate, so we are left with the other. More and more people are scoring on the tape, but not me. Never mind — I'll think of something to say after lunch, surely.

1.00: Lunch. I choose a place on what turns out to be low table, peopled with nonentities. No opportunities for crawling here. Not only low, it is thirsty. Other tables send half-full bottles back to the kitchen; ours were drained before the arrival of the soup. The food, of course, is diabolical, and I resign myself to an afternoon of flatulence.

3.05: The afternoon session begins at last.

4.30: Tea. "Super" seems to be the thing to say in response to almost anything. A kind fellow talks to me for 10 minutes, only to realize at parting that he has mistaken me for someone met in Kalamazoo. Another, who 10 minutes earlier had made a warm public plea for "greater opportunities

for informal discussion" is lukewarm when I turn his *le-tête-à-tête* with a blonde postgraduate into a *menage-à-trois*.

5.00: Sprawling my puzzled way through the last rites, I can't help wondering what all these people have got that I haven't — apart from a job. Not PhDs ("Haven't touched it since I was appointed — just haven't had the time.") Some are too old to count. Several have beards, two very bushy. One young man is immensely tall. There are some women. All are assured, exuding a calm, urbane confidence in themselves and in the importance of their work.

5.30: It's all over, and I am the only one present not to have got voice on to tape. *Tant pis*, as one of the others said, about something else entirely. An American woman has cadged a lift to the station, and I tug along. She is a flying Dutchman of the conference scene, turning up anywhere and everywhere if she can get finance. X last weekend. Y on Friday. S... today and Scotland on Monday. Admits only a passing interest in our particular subject, but came because it's always so friendly. Regrets she can't persuade her department to back her for Italy in the summer. Our driver, a local man, commiserates, as he searches the city centre in vain for the station. The lady observes that she would not like to teach in this neck of the woods.

6.00: At last we arrive, in good time for her train, and very good time indeed for mine. As she disappears through the barrier, I find I have two hours to kill. The bar is full of disappointed soccer fans, but the beer could be worse.

8.00: The return trip turns out to be a parody of the smooth morning's journey. The first train is a mere 15 minutes late, and consists of a cashiered suburban stock, good enough in its day for an arable or a mile or two between stops, but pathetically unsuitable in its dotage for an Inter-City run. After half an hour I revise my opinion of the university's toilet facilities — for here there is no lavatory. In the land of the blind... I really shouldn't have had that second pint. Fortunately the train needs a 10-minute rest at N, and all is well. The old couple opposite promise to pull the cord if the train starts off without me.

10.15: In comparison, and in principle, the second train is wonderful. Toilets aplenty, a buffet (closed), and intercom — over which a friendly voice informs us of vague difficulties "in the north west" upon the outcome of which, like Duncan, our fate hangs. Lots of "bloody men" about; all dressed like captains, but none can enlighten us. One hour late, with no news from the north west, we set off. The train itself is in a sulky mood, and meanders through forgotten byways of the railway network. Clearly, the driver, if there is one, has no control over it. On smooth track the train fails and slouches; on rough sections it perks up and fairly rips into the night, pounding and shaking and terrifying us helpless passengers.

1.00 am: We no longer stir. Three-Turks have just seen their station — a scheduled stop — slide past uninvited, but they only laugh. For myself, I discern a remote affinity between BR and academe. Lumbering, churning, bumping, occasionally hurtling on into the night, destination forgotten, time's flow suspended, the "real" world just a distant glow of lights unpredictably appearing and disappearing. I soothe my eager-to-panic heart by reading, re-reading and re-reading again those blessed conference hand-outs.

Steve May

The author is unemployed.

For a number of different reasons I have been driving many times recently around the country. Although I would infinitely prefer lonely country lanes if there were any left (you only have to stop for a few minutes on some remote Yorkshire moor nowadays to be howled at by angry motorists desperate to get nowhere and finding you in the way), I have had to make some attempt to get to meetings on time and have therefore been following the motorways, especially the M1 which goes out of Leeds to the south. As soon as you disentangle yourself from the system of half-finished feed roads and can discover the way out, you are on the high road south.

But not for long. The fact is that within a few miles there will be a threatening sign indicating that men are digging up the road or even a huge exclamation mark to show that they haven't yet made up their minds. Motorists start to weave from side to side; lanes are closed; and you try to follow the line through a lot of obstacles. Most of them are cones.

I am getting very annoyed by these cones. I am sure they were smaller a few years ago and that they have taken a drug and started growing. Every time I drive along there are more and more cones and they are getting closer together, standing shoulder to shoulder like an eighteenth-century army. Sometimes, like a group I saw a few nights ago, they seem to have all been shot up and are lying in heaps where they have fallen with their face to the foe.

They are not alone. Although they usually crowd together for protection, every now and again they have gone away and instead of the cones there are thin red and white semaphores, mostly vertical, some leaning a little, evenly spaced and standing on top of cat's eyes. After a few miles the cones come back again, more threatening than before, twisting away into the distance.

The point is — and this is what I am slowly getting round to — that the cones are not there because of men working. There are never any men to be seen. Once or twice I have spotted a large yellow machine lying deserted by the road and once I believe I saw a man with a pipe in his mouth surveying the scene and waiting for someone to come along and pick him up. But usually there is no one to be seen at all and no work going on.

Perhaps, I thought for a time, they work in the early hours before we all get on to the road. And since they have all the benefits of modern technology

Reflections from the slow lane of life



Patrick Nuttgens

and the use of machines, they can do the work very quickly and have gone home. But then I find from a man who drives along these roads in the early hours that it is not so. The cones areas and lanes are just as deserted as before. And I have heard from a rather futuristic man who drives everywhere at night: that no work is done then either.

The fact is that motorways are one of the great image-making events in our civilization. The opposition to them, which reached a peak a few years ago and seems to be relatively quiet at the moment apart from rumblings about the Oxford bypass extension always had a note of hysteria about them. John Tyne who was an expert at disrupting official inquiries, gave almost everything else and devoted their lives to the issue. I was involved with the inquiry into the proposed inner ring road for York and knew at first-hand how the issue split families down the middle, terminated old friendships and provoked letters of hate.

The image quality of the motorways was very marked in the 1960s. Of the writers who used them as a potent symbol of our social and intellectual predicaments the most effective for me was Harvey Cox, whose book *The Secular City*, 1965, became a cult book

for a short time. I met Cox at a huge and expensive conference of planners and was never entirely sure whether the organizers had thought he was a city planner, not the theologian who saw the secular city as the contemporary follower of the city of God.

In that book there are two very expressive symbols in which he explains the shape of the secular city. One, which is the symbol of anonymity, is *The Man at the Giant Switchboard*. He is technopolitician man, who sits at a vast and immensely complicated switchboard. He is *homo symbolicus*, and the metropolis is a massive network of communications.

The other, which is the symbol of mobility, is *The Man in the Crowd*. And that is where my motorway comes in. For in Cox's view technopolitician man is on the go, not only geographically but occupationally; mobility and social change are closely linked; mobility, he says, is always the weapon of the underdog, who may not be kept down for ever. In the First World War they sang "How Ya Gonna Keep 'Em Down on the Farm Now that They've Seen Parade?"

Cox does not use his cloverleaf symbol as fully as he might. I elaborated it myself in a book from which I might as well quote since nobody has ever read it (to judge from my royalties). The point about the cloverleaf is that it enables a driver to take a new direction without crossing a single line of traffic. The crossing is complex, based on calculations of flow, man-made and wholly artificial. The technical problem is estimating a weaving distance for moving into and out of a moving stream of traffic, so that you can change direction without forcing someone else to stop his own career; he merely comes into vision and disappears again into obscurity.

Man is isolated in his little box, moving in a world dictated by construction and management. But he must know where he is going. A direction to take out of the cloverleaf. He is dependent upon instructions in the vehicle and on the road. And individualism does not pay; he must conform to the rules.

Next time I drive along this motorway I must think about the analogy. Perhaps the man in the cloverleaf is a good symbol for a polytechnic director who does not quite know where he is going. I wonder if the chairman of the National Advisory Body might see himself as the man at the giant switchboard.

A brief aside from the back of the class



Keith Hampson

So we are back at school again. A nice quiet beginning to what I thought. We started with Wales and the Arts. But we were not taking account of Michael Foot's new vitality — as his polls zoom up to 20 per cent. Labour is no longer dithering. It is fighting tooth and claw, with as much noise as it can muster. I haven't really made up my mind quite how to do it, but the act is being slowly pulled together. And Tony Benn is nowhere in sight.

Nor do we see much of Roy Jenkins these days, and Shirley, too, is virtually living in Gorbey. Roy Jenkins must wonder at times whether an alliance is really such a good idea after all. Though his pained expression may have more to do with the taunting libel of Dennis Skinner, who has ousted him from the front bench before the gateway, than with the Liberais alongside him.

He does, of course, have William Pitt. If the first two rank as two of this country's finest statesmen, their contemporary namesake might just resemble a Croydon councillor. "He really is grisly," commented one of my colleagues, since Mr Pitt tends to wave eloquent about his "mature child" — by which he means his 23-year-old daughter.

But what does one expect from the Polytechnic of the South Bank? The Tory Party has for some years been of the view that there are decidedly too many former polytechnic products on the benches opposite. They all sound very erudite, but like the proverbial Chinese meal, seldom is anything left after five minutes.

Comprehensive but not necessarily accurate, is the Social Democratic Party's policy document on education. It smacks of the Leverhulme committee's work but with no costings. It also claims that within two years the "age participation rate" will be "around" 10 per cent. In fact, it has already gone up from 12.4 per cent in 1979 to 13.2 per cent and with level funding is clearly not going to drop as the SDP forecasts.

In that golden period of Labour Government when Shirley Williams was Secretary of State for Education, I used to keep asking for clarification of these wretched comparisons which are constantly made between the numbers entering higher education in this country as against those abroad.

I have always found it hard to believe that we could be so much worse than other countries. From an admittedly limited experience of Germany, it seems to me that they cannot have more than twice as many 18-year-olds in higher education. There is surely a problem of definition. Our traditional does not include part-timers and some courses abroad are labelled "higher" when they fall into our category of "higher education" but which is also

overlooked is the fact that so many 18-year-olds deliberately opt to study in the private sector in one way or another. Would-be architects, those in banking and a whole range of professional work, are studying at a "higher" level but are taking qualifications outside the system on which the calculation of the participation rate is based. All in all, probably close to 40 per cent of the age group are studying at a "higher" level. Apart from the weak? We do ourselves and our reputation no good at all by perpetuating — and spreading — the myth that we are the worst-educated nation among all the advanced countries, which is what the SDP is claiming.

This is not to say that there is not much good sense in their policy document. But it is prone to opt for the grand vision, while backing out of important immediate issues. Take the role and nature of the University Grants Committee and whether the binary line should exist or not. The SDP proudly announced that they will "address ourselves to questions of control and finance", but that is as far as it gets. In fact, the university system as a whole is characterized by extraordinary diversity. The local authorities have not covered themselves with glory in the new National Advisory Body framework and the process is painfully time-consuming. As for the UGC, it is simply not suitable for the administrative role it is now expected to play.

Its membership does not reflect the diversity of the universities. A committee of part-timers, it has far too few industrialists and non-academics. Its sub-committees reflect too much the traditional values of academics. If the NAB and the UGC were both subsumed in a newly-constituted planning body for all of higher education, we could solve both problems — at a stroke, as we used to say.

LETTERS TO THE EDITOR

A significant issue at Paisley College

Sir, — Your Scottish correspondent's article (*THES*, April 22) of the intended cuts at Paisley College emphasizes a trivial issue and largely ignores a significant one. It is surely unnecessary to speculate on whether the Scottish Education Department's decision was influenced by the fact that the professor of politics and sociology is a communist. The present government's lack of enthusiasm for the social sciences is well known. Furthermore, some of Professor Foster's colleagues are members of the Conservative Party.

Much more important is that the SED has treated the college in an utterly arbitrary and highhanded manner. If the Government's actions go unchallenged, other institutions may also be in danger.

As a Scottish central institution, Paisley College has a more direct relationship with government than either universities or polytechnics. The SED funds the college directly, not through University Grants Committee or local authority. Degree courses are supervised and approved at all stages of planning. Admissions targets are approved degree by degree. Whatever drawbacks this has had from the standpoint of academic freedom, in the past Paisley has at least been able to believe

that, being so closely monitored, it could never do anything which might call down upon it the Government's wrath. This has now been shown to be an illusion.

The BA social science degree, having grown gradually to an annual intake of 80, was due for re-submission to the Council for National Academic Awards this academic year. The SED gave permission to proceed at the initial stage but when the final documents were ready to be presented for CNA's scrutiny, SED said it did not like unspecified "changes" in the degree. The college responded by re-vamping the proposal by strengthening its vocational character. In its turn, SED has given a categorical "no" and says the degree must be phased out entirely.

The treatment of the BA applied social studies (not mentioned by your correspondent) is even more arbitrary. There has never been the slightest hint by the inspectorate that it was anything other than entirely acceptable to the SED. The department re-approved it, with an increased recruitment from 60 to 80, as recently as October 1982. Now six months later, and after a successful CNA visit, comes the SED's decision to discontinue this degree also.

Professor Richmond) has already expressed a willingness to discuss problems and to consider ways in which Manchester might improve the conditions under which it employs research staff.

At the same time as tackling issues at the level of individual universities, the longer-term issues concerning career structures will have to be tackled at national level by the various organizations, representing research workers. It is misleading, however, to suggest that the unions are in conflict over the fundamental objective of improving the conditions under which research is carried out in the universities.

BRIAN HARRISON,
Secretary,
ASTMS,
University of Manchester

DAVID WILKIN,
Convener,
Working Party on Research Staff,
Employed on Fixed Term Contract,
University of Manchester.

Natthe and racism

Sir, — I would like to take issue with the National Association of Teachers in Further and Higher Education (*THES*, March 24) about Mr John Fernandez's decision to take racist police cadet essays to a television team.

If Natthe is so concerned about professionalism of lecturers in the further education sector, why has it not established a code of conduct for its members on issues of racism? In the absence of such a policy, it is to Mr Fernandez's credit that he has brought this grave issue to the attention of the public. It is particularly important at this moment in time when the Police and Criminal Evidence Bill is being debated that such a critical issue as racism receives public attention. Natthe should, in fact, explain its lack of policy in this critical area, rather than victimize Mr Fernandez who has taken a courageous stand on this issue.

It is important that the association thinks through its support for "racism awareness" courses, and structures them within a broader strategy. "Racism awareness" by itself can only hope to deal with racism as expressed by individuals but would not necessarily deal with racism as evidenced through the policies and practices of institutions.

Yours sincerely,
JAGDISH S. GUNDARA,
Coordinator,
Centre for Multicultural Education,
University of London, Institute of Education.

Psychological society

Sir, — In your report (*THES*, April 15) of the symposium which Guy Oxton and I convened at the annual conference of the British Psychological Society, you mention Professor Gale's proposal for a division of the society devoted to teaching.

I support the idea that the society should have its own arrangements for its purpose, and your report might give the impression that no organization for teachers of psychology exists. In fact, the Association for the Teaching of Psychology which some of us started over ten years ago, flourishes in co-operation with the BPS, having its own journal, newsletter, and regular programme of activities. It is open to anyone interested, and may be addressed to the BPS, 48 Princess Road East, Leicester, LE1 7DR.

JOHN RADFORD,
North-East London Polytechnic.

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Coordinator,
Centre for Multicultural Education,
University of London, Institute of Education.

Sir, — I was intrigued to learn from Felicity Jones's report (*THES*, April 15) that leading members of the Inner London Education Authority's Labour Group favour a strategy of sending in an ILEA management team to run the Polytechnic of Central London.

In fact, as the report goes on to make clear, the ILEA Labour Group prior to its further and Higher Education Committee, has formulated a strategy for PCL. We have agreed with the PCL that we will work together to decide what arrangements should be made in the period until a permanent rector can be appointed. While Felicity Jones's article outlines many intriguing and imaginative possibilities for an external management team would not seem to me likely to give the stability needed by the polytechnic to continue the progress it has already made in putting its financial affairs on a second footing for the future.

Yours faithfully,
NEIL FLETCHER,
Chairman of PHE Sub-Committee,
Inner London Education Authority.

Misplaced concern

Sir, — David Garner's letter (*April 22*) expresses concern that we should be advertising a Social Science Research Council linked studentship to read for a PhD in the school of education at Exeter University, without requiring the applicants to have had teaching experience or to have taken a Postgraduate Certificate in Education. He assumes that this will produce research which is unrelated to practice, and also confuses the matter with Sir Keith Joseph's plans to improve teaching quality by increasing the number of teacher trainers with recent school experience.

First of all, SSRC studentship holders are not employed to train teachers. Our teacher training is done by a large group of tutors, the vast majority of whom continue to do some teaching in schools. This includes, incidentally, people like Professor Richard Pring who is responsible for the BEd course and who teaches a class of fifth years, and I also teach a class of seven-year-olds in a social priority school.

SSRC studentship holders come to us to receive research training while attached to a project under the direction of some of these same tutors. Most studentship holders are in fact experienced teachers, though one of our best is, and their research, like our own, is mainly oriented towards action or the understanding of practice.

Were we to be so foolish as to assume that only trained teachers could have insights into classroom life we should rule out people with very interesting experience and background in psychology, social work and other distinguished researchers into children's learning, like Jerome Bruner, do not have a PGCE. Indeed, we half hoped he might apply.

Yours,
PROFESSOR E. C. WRAGO,
Director,
School of Education,
University of Exeter.

PhD reviews

Sir, — Further to the article, "Rejects who want to know why" (*THES*, April 15), in which unbeknown to me my name was included, I would like to make the following observations concerning Hull University's procedure with "technical matters". Their fixed Postgraduate Review Procedure is, says Hull's vice-chancellor, Sir Roy Marshall, for students who feel that "the conduct of their examination has been procedurally irregular or unfair".

What price this, when allegations such as incompetence or bias of the examiners would be ruled out of court as being not matters of procedure? Appeal procedures which discourage consideration of such serious, and fundamental, allegations cannot in any sense of natural justice serve the rights of a student, or give him a realistic chance of appeal.

Of course, there is no logical reason why such matters cannot be considered under the Postgraduate Review Procedure in its present form. If the examiners are not suitably qualified or experienced in the relevant area of study, then they cannot make a valid judgment of whether a thesis is of PhD standard. This is not a matter of questioning the academic judgment of the examiners, as Hull would suggest, but of questioning their competence to make such a judgment. The appointment of inappropriate examiners must constitute a procedural irregularity which it contravenes the purpose of the examination.

Clearly, to adjudicate fairly on such matters, it would be necessary for the university to seek independent opinions from one or more specialists in the field of study of the thesis in order to establish the suitability or otherwise of the examiners. However, a university may be reluctant to take such a step, on the grounds that it would be "examining the examiners", and the student is consequently placed at an unfair disadvantage.

Yours faithfully,
ANNIE S. HAWKINS,
Principal,
Queen Elizabeth College,
University of London.

Getting in training for the march

Last Saturday, April 23, the Peoples March for Jobs '83 started from Glasgow. Feeder marches, one starting from Land's End, one from Halifax, one from Great Yarmouth will eventually join and converge on London where there will be a festival and rally during the weekend of June 4 and 5. A core of marchers will be sponsored on each march but thousands of people, ultimately tens of thousands, will be involved in some way in bringing the march to fruition.

Critics of trade unions — who never seem to be lacking — suggest this is a politically motivated event unrepresentative of the majority of trade union members. Natthe however, will be urging its members to participate and support the march and associated events in whatever way possible. This is because it is important that throughout the march the link between education and unemployment is made clear and explicit and unions such as Natthe are well placed to highlight this message.

Firstly, our experiences with the Youth Training Scheme, and its many forerunners, have brought large sections of the membership in direct contact with the young unemployed and they see all too clearly the corrosive effect which unemployment has upon young people.

Colleges have also developed a variety of courses to meet the needs of the local adult unemployed in the community. Some courses, for example, have been specially designed,

using EC funds, to offer new opportunities to workers in industries suffering large scale retrenchment.

Natthe, in conjunction with the Association for Adult and Continuing Education has produced a discussion document entitled *Adult Unemployment*, while the Manpower Services Commission has just published its own discussion paper "Towards an Adult Training Strategy". There is always a danger that the suggested emphasis, at least in the short-term, in the MSC document, of training and retraining opportunities for those in employment will simply result in a further cycle of deprivation for those who are unemployed. We need an education and training strategy that will encompass both those in employment and those adults who are already unemployed, and the many more who are likely to experience periods of unemployment throughout their working life if current economic prognoses are correct.

The director of the MSC, Geoffrey Holland, has drawn attention to the neglect of adult education and training in Britain in contrast with other industrialized countries. While the relationship between educational levels of attainment and economic growth are complex, the fact that two thirds of the British labour force have no vocational qualifications compared with only one third in Germany, or that the overall level of educational attainment of the Japanese workforce is so much higher than in Britain cannot be irrelevant to any such equation.

We hope therefore, that throughout the six weeks or so in which the march will be on the road, the central importance of education and training provided by colleges and polytechnics, as well as other agencies, will be recognized, and the folly of the present policies which pay lip service to expanding opportunities while at the same time cutting back on the resources needed to create new courses and opportunities for the unemployed will be widely exposed.

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The author is the assistant secretary for higher education at the National Association of Teachers in Further and Higher Education.